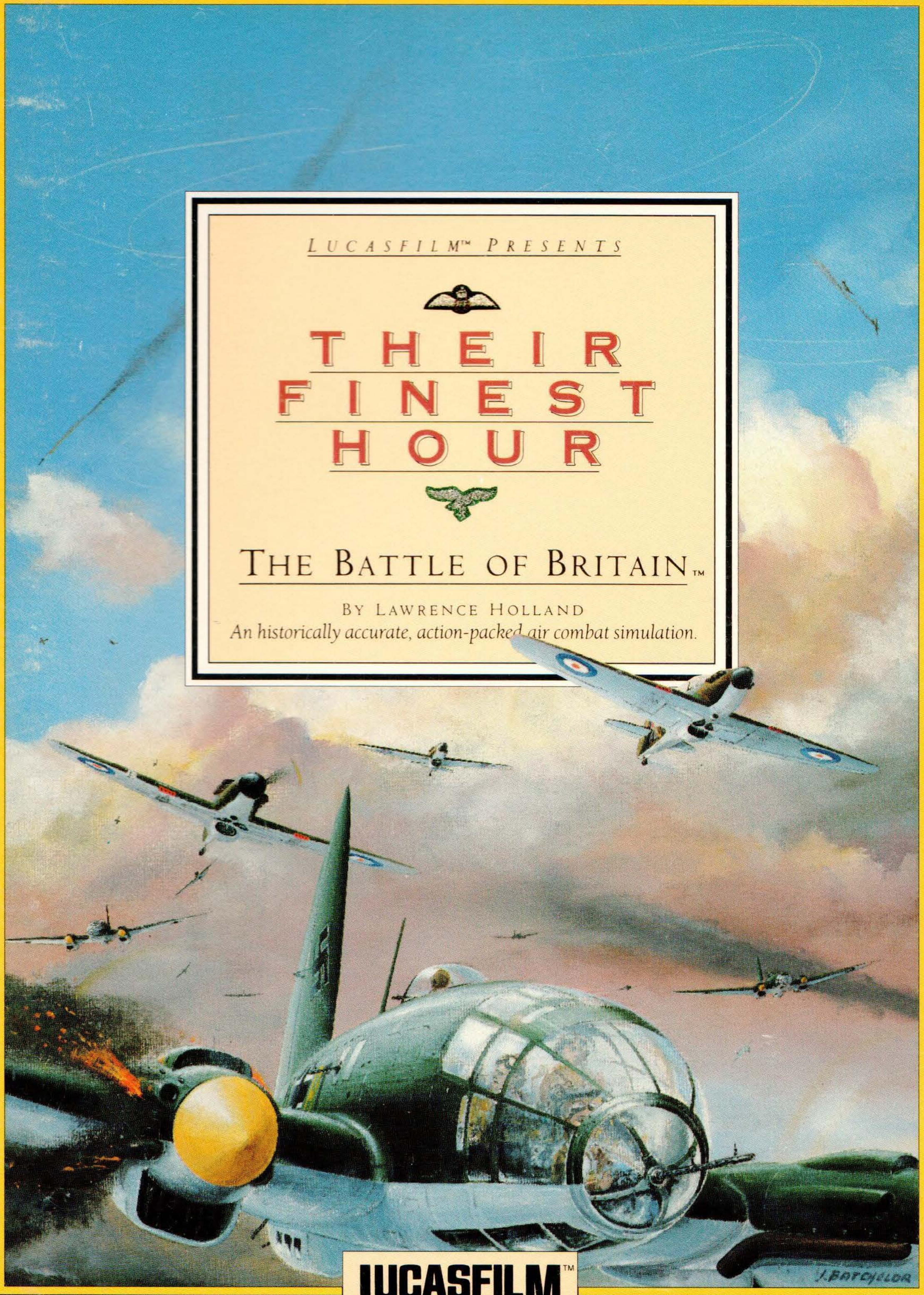
LUCASFILM™ PRESENTS

THEIR FINEST HOUR

THE BATTLE OF BRITAIN™

BY LAWRENCE HOLLAND

An historically accurate, action-packed air combat simulation.



LUCASFILM™ GAMES

THEIR FINEST HOUR
THE BATTLE OF BRITAIN™

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"If the British Empire and its Commonwealth last for a thousand years, men will still say: 'This was their finest hour!'"

Winston Churchill, 1940



Their Finest Hour: The Battle of Britain™



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CREDITS

Created and Designed by
Lawrence Holland

Programmed by Lawrence Holland
Aircraft Cockpits and Background Art by
Martin Cameron
Aircraft Images and Background Art by
James McLeod

Project Leader, Lawrence Holland
Lucasfilm Games V.P. and General
Manager, Steve Arnold
Director of Software Development,
Akila J. Redmer
Director of Marketing, Doug Glen
Marketing Communications Manager,
Mary Bihr
Print Production Manager,
Carolyn Knutson
Administrative Support, Stacy Lamiero,
Wendy Bertram, and Paula
Hendricksen

Playtest Manager, Stephan Butler
Lead Playtesters, Ezra Palmer-Persen,
Jim Thomson, Jon Gubman, and
Bret Barrett
Thanks to all the other playtesters,
especially Akila J. Redmer, Noah
Falstein, Kalani Streicher, Steve
Purcell, and Mike Ebert

Manual Written by Victor Cross
Additional Manual Contributions by
Lawrence Holland
Manual Design and Layout by
Shepard Associates, San Rafael
Maps and Illustrations by Mark Shepard
Additional Graphic Support from
Barbara Lawrence, John Harris and
Peter DiVenere
Copyediting by Betty Hey
Package Design by Rick Strand
Cover Painting by John Batchelor

Thanks to Larry Wilson, Photo Librarian
for the Smithsonian Air and Space
Museum
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Lucasfilm Games, PO Box 10307,
San Rafael, CA 94912 USA

Preceding page: Scramble! With the Luftwaffe heading their way, a squadron of Hurricane pilots race toward their fighters. *Courtesy of the Imperial War Museum.*

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INTRODUCTION

Their Finest Hour: The Battle of Britain is a World War II air combat simulation that recreates the duel between the German Luftwaffe and British Royal Air Force waged in the skies above Britain from July to September 1940. When you play *Their Finest Hour*, you can fly for either the offensive-minded Germans or the defensive-minded British, and you can choose from a variety of Luftwaffe fighters, dive bombers, and medium bombers, or Royal Air Force (RAF) fighters. If you're a British pilot, you're defending your home country from an onslaught of Luftwaffe bomber and fighter attacks. If you're a German pilot or crew member, you're trying to knock the RAF out of the air, as well as bomb land and sea targets, so that Operation Sea Lion — the invasion of England — can commence. Whichever side you choose — and we encourage you to play both — you'll experience a highly detailed, historically accurate recreation of those events from the summer of 1940, when the fate of the world was literally up in the air.

In *Their Finest Hour*, you move through a series of menus to choose your missions and aircraft. You learn and practice the fundamentals of flying single-seat fighters, double-seat fighters and dive bombers, and medium bombers. Then, you can continue on to Combat Flights, where you take part in missions based on ones actually flown during the Battle of Britain. To put yourself in the role-playing mood, you create a pilot or an entire crew, and keep track of their progress in a Combat Record. If you're good enough, you'll win medals and promotions; if you're not, you'll discover the true price of glory. For an additional challenge, you can fly in Campaign Missions, where you can actually change the historical outcome of the Battle of Britain.

> **"All that happened was that we had made a number of attacks against England between 1940 and 1941. Then we discovered that we were not achieving the desired effect, and so we retired. There was no battle, and we did not lose it."**
>
> **Luftwaffe Major Adolf Galland**

We've added a long list of extra features to make *Their Finest Hour* the richest, most varied game of its kind. For example, in those aircraft with more than one crew member, you can man all the positions, including bombardier, rear seat gunner, and any one of up to five medium bomber gun posts. With a special Replay Camera feature, you can "film" your combat action, then move to a special viewing room and watch your "movie" from a variety of different camera positions. Also, anytime during your mission, you can call up an

In-Flight Map/Radio, which gives you detailed information about where you'll be flying and the targets you'll be attacking. And, for the ultimate challenge, you can actually create your own missions, and then see if you can survive them.

We could tell you more, but you're probably eager to climb into the cockpit right away. So keep a steady hand, and good hunting!

"I have nothing to offer but blood, toil, tears, and sweat."

Winston Churchill, in his first speech to the House of Commons, May 13, 1940

How to Use This Manual

Though this manual is nearly two hundred pages long, it doesn't mean that you'll be spending months learning to play the game. What you'll find between these covers is a wealth of historical background information, as well as details about the aircraft you'll be flying — and flying against. What's more, to help you master the art of piloting a plane, there's a detailed section covering flight controls for each of the three categories of aircraft in the game: single-seat fighters, double-seat fighters and dive bombers, and medium bombers.

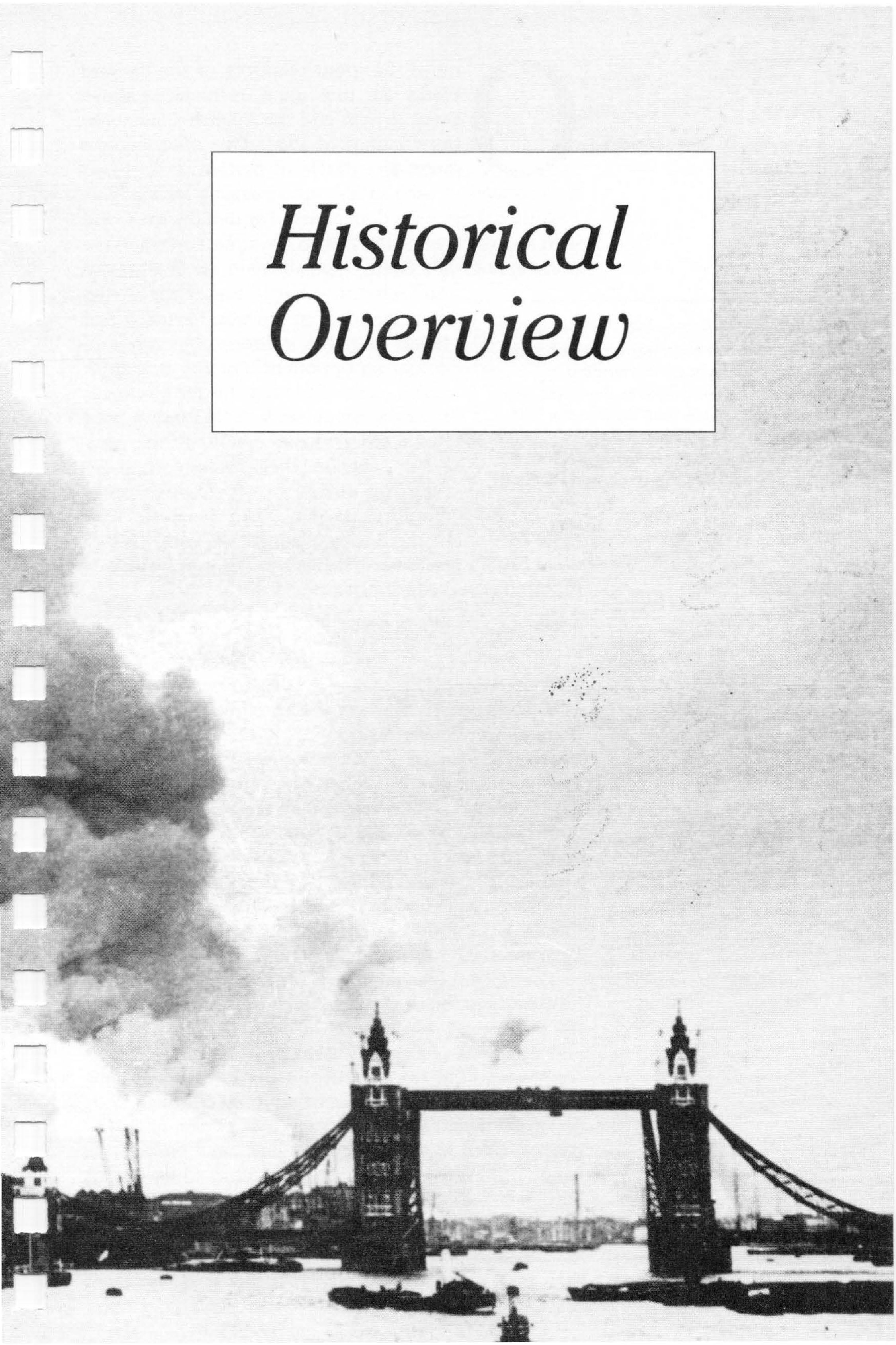
We recommend that you first turn to the *Loading Instructions* on your Reference Card, which you'll find inside the box that the game came in. This tells you how to start up the game from the floppy disks, and how to load them onto your computer's hard disk drive. Next, look at the *Quick Start* section of your Reference Card. By following the *Quick Start* instructions, you'll soon be up in the air on a trial Training Flight.

Now turn to *Mission Instructions* in your manual. This information is covered in three chapters: *Pre-Flight, In-Flight,* and *Post-Flight.* In *Pre-Flight* you'll learn how to select your mission, get your flight briefing, and choose your flight roster. *In-Flight* gives you specific details about how to fly the different aircraft, drop bombs, use machine guns, and more. In *Post-Flight,* you'll find out about your post-flight review, plus how to win medals and promotions in rank.

Then, when you've had some combat experience and want to know more about what happened during the Battle of Britain, read the *Historical Overview* and *Pilots' Perspectives* chapters for both a historical and a personal view of the conflict. For more information about the aircraft that flew in the Battle of Britain, turn to the *German and British Aircraft and Weapons* chapter. Finally, to become even more proficient as a pilot or crew member of a fighter, dive bomber, or medium bomber, read the *Flight Fundamentals and Tactics* chapter.



Historical Overview



One of the great conflicts of the Second World War took place in the skies above Great Britain and the English Channel in the summer of 1940. This epic engagement, the Battle of Britain, pitted two nations against each other, one struggling for survival, the other striving for domination. For months the world held its breath while the British Royal Air Force and the German Luftwaffe dueled high above in the English sky. And when the battle was over, for the first time ever in the war, Germany had failed to gain a military objective and defeat an opponent. For the British, it was a glorious victory; for the Germans, it was a minor setback that could have had a different outcome had their leaders not changed their strategy when victory was within reach. Though there would be larger, more dramatic, and more decisive battles during the next five years, the Battle of Britain would nevertheless go down in history as one of the crucial turning points of World War II.

> **"We shall not flag or fail. We shall go on to the end. We shall fight on the beaches, we shall fight on the landing grounds, we shall fight in the fields and in the streets, we shall fight in the hills; we shall never surrender."**
>
> **Winston Churchill, in a speech to the House of Commons, June 4, 1940**

PRELUDE TO BATTLE

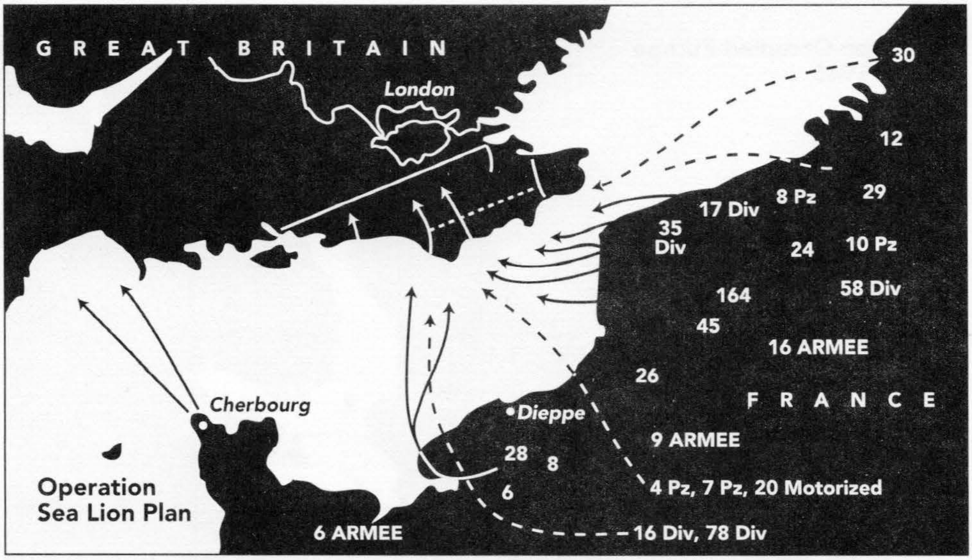
Adolf Hitler's election as chancelor of Germany in 1933 marked the beginning of Germany's reemergence as a world power. The war-weakened nations that had defeated Germany in World War I watched helplessly as Hitler proceeded to break the terms of the Versailles Treaty under which Germany had previously surrendered. In 1933, a new German air force, the Luftwaffe, was created. In 1935, the German Army was organized and armed. Shortly afterward, German troops reoccupied the demilitarized Rhineland, which was established as a buffer zone between Germany and France. And in 1938, the German Army invaded Austria, and incorporated it into Germany.

The British government, led by Prime Minister Neville Chamberlain, tried to appease Germany, and in the process allowed the German Army to occupy the Sudeten area of Czechoslovakia. But when German troops invaded the rest of that nation, Britain and France decided that Germany had to be checked. Both countries signed an agreement to assist Poland if it was ever attacked by Germany. That day came on September 1, 1939, when the German Army crossed the Polish border; two days later, Britain and France declared war on Germany.

Preceding page: London burns following a Luftwaffe bombing attack. *Courtesy USIA National Archives*



These two allied nations, reluctantly forced into war, were powerless to stop Germany's momentum. Poland fell before the British and French could help, then Denmark and Norway were invaded. After a brief lull, German tank divisions moved into the Netherlands, Belgium, and Luxembourg without warning on May 10, 1940. As the German Army pushed its way into France from the north, the British Expeditionary Force, which had been sent to help the French, was cut off and forced to retreat toward the Belgian coast. Pinned at the coastal town of Dunkirk, 338,226 British and French



Operation Sea Lion Plan

troops were evacuated by 860 ships of all sizes in Operation Dynamo. Although "the miracle at Dunkirk" saved the British Army from annihilation or capture, most of its tanks, guns, and heavy equipment were abandoned on the beach. With the British gone, French resistance flagged, and on June 22, the defeated French forces were granted an armistice by the Germans. Britain now stood alone against the Third Reich.

OPERATION SEA LION

With the fall of France, Hitler turned his attention toward Britain. At first, he believed that he could force the British to sign a peace treaty, like the French. But the new British prime minister, Winston Churchill, rejected the offer. Germany, he said, would have to relinquish all territorial gains before Britain would negotiate. Otherwise, Britain would accept nothing less than total victory and the unconditional surrender of Germany.

Realizing that the British were determined to fight to the end, Hitler concluded that Britain posed a grave threat as a hostile base from which landings on German-occupied Europe could be launched. On June 4, Hitler signed Directive No. 16, which stated "Since England, in spite of her hopeless military situation, shows no signs of being ready to come to a compromise, I have decided to prepare a landing operation against England, and, if necessary, to carry it out." The code name for this was Operation Sea Lion.

Hitler's admirals argued that no invasion of Britain

could take place until the Luftwaffe had established air supremacy over the English Channel and Southern England. After all, it was British fighter cover over Dunkirk, flying in a shuttle from fighter bases in Southern England, that had blunted the Luftwaffe attacks on the British Army and allowed the evacuation to take place. If the Luftwaffe could control the air, the invasion barges could safely cross the Channel, and the German Army could land on the beaches of Southern England. Hitler agreed, and the invasion was set for September 1940; any later, and bad weather would render a Channel crossing next to impossible.

"As far as I can see, we are, after years of leisurely preparation, completely unprepared."

Sir Alexander Cadogan, in his diary, June 1940

Plans for knocking out the Royal Air Force (RAF) began to take shape. Airfields in France, Belgium, and the Netherlands were converted to Luftwaffe bases, then stocked with planes, fuel, ammunition, and bombs. Meanwhile, a variety of river barges were gathered, and work began on converting them to landing craft.

THE LUFTWAFFE: JULY 1940

As nation after nation fell to Germany, the Luftwaffe, under Reichsmarschall Hermann Goering, expanded its five areas of coverage. These areas were known as Luftflotten, and were the largest tactical units in the Luftwaffe. Three of these Luftflotten were to launch the attack on Britain.

The Luftflotte which had the most responsibility for the destruction of the RAF was Luftflotte 2, commanded by Generalfeldmarschall Albert Kesselring, a leader in the Polish conquest. With bases in Northeast France,

Hermann Goering, Adolf Hitler, and Grand Admiral Erich Raeder

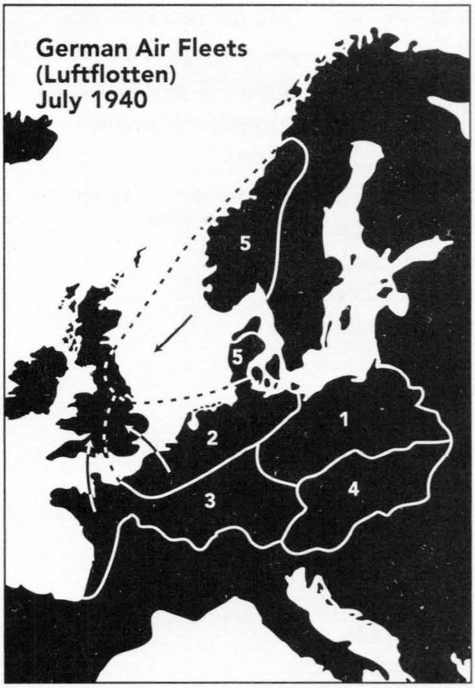


Belgium, and the Netherlands, Luftflotte 2 had the shortest distance to travel across the English Channel. Luftflotte 3 was based in Northwest and Central France, and its aircraft covered the longer distance across the Channel. Its leader was Generalfeldmarschall Hugo Sperrle, who had commanded Germany's Condor Legion in the Spanish Civil War. Luftflotte 5, with bases in Norway and Denmark, was commanded by Generaloberst Hans-Juergen Stumpf. The smallest of the three units, its aircraft had the longest route to Britain across the North Sea.

Between the three Luftflotten, there were 864 bombers, 248 dive bombers, 725 single-engine fighters, and 200 twin-engine fighters. Most of these aircraft had proved to be hugely successful in the Spanish Civil War and the recent conquest of Europe. But in those conflicts, they were used in combination with ground attack forces. Now they would be tested in a totally new and unfamiliar role: destroying an enemy air force single-handedly. The strengths and weaknesses of these aircraft would prove to be a critical factor in the months ahead.

Since Germany had failed to develop a long-range, four-engine heavy bomber, the bombing tasks fell primarily to a pair of twin-engine medium bombers, the Heinkel He 111 and the Dornier Do 17. The He 111, known as *Die Spaten*, or "The Spade," could carry a bombload of two tons, yet only manage a top speed of 273 miles per hour. The Do 17, nicknamed "The Flying Pencil" because of its thin fuselage, was slightly slower at 265 miles per hour, and could only carry about half the bombload of an He 111. These two aircraft were vulnerable to fighter attack from certain angles, and extra machine guns and armor were added. Despite their recent successes, the He 111 and the Do 17 were outmoded by 1940 standards. A newer, faster medium bomber, the Junkers Ju 88, began arriving at the airfields in France in mid-1940, but not in large enough numbers to replace the older bombers.

Although the Ju 88 could also dive-bomb, the main German dive bomber in 1940 was the Junkers Ju 87 *Sturzkampfflugzeug* (dive-attack aircraft). Otherwise



Serviceable German Aircraft in the Battle Area July 20, 1940

In Scandinavia:

69 Bf 109 fighters
32 Bf 110 fighter-bombers
95 bombers
48 long-range reconnaissance
15 coastal reconaisance

On the Continent:

656 Bf 109 fighters
168 Bf 110 fighter-bombers
248 Ju 87 dive bombers
769 twin-engine bombers
48 long-range reconnaissance
46 coastal reconnaissance (minelayers/weather)

Serviceable British Aircraft in the Battle Area July 20, 1940

531 single-engine fighters

known as the Stuka, the Ju 87 was successful in the Polish campaign, where its precise bombing ability and the scream from its landing gear-mounted sirens, called the "trumpets of Jericho," made it a favorite of the Nazi propaganda machine. But since most of the Polish air force had been destroyed on the ground, the Stuka had faced little opposition from fighters that could exploit its slow airspeed.

"My Luftwaffe is invincible. And so now we turn to England. How long will this one last — two, three weeks?"

Reichsmarschall Hermann Goering, June 1940

In the area of fighters, the Luftwaffe was better prepared. The main German fighter in 1940 was the Messerschmitt Bf 109, one of the most formidable fighter aircraft in the world. Fast and highly maneuverable, the Bf 109 had proved to be nearly unstoppable in the Spanish Civil War and the European conquest. But it had a short range, which meant it could not cross the North Sea from the Luftflotte 5 bases, and if launched from France, could only stay in the skies above Britain for twenty minutes. However, Luftwaffe brass did not believe this to be a problem, for they already had a long-range



A member of the Observer Corps scans the skies above London for incoming Luftwaffe aircraft

fighter developed primarily for escorting bombers. This was the Messerschmitt Bf 110 *Zerstorer*, or "Destroyer," a twin-engine aircraft heavily armed with two cannon and four machine guns in its nose. Because it was so large, however, it was not as maneuverable as smaller, single-engine fighters.

Despite the drawbacks of its aircraft, the Luftwaffe enjoyed a numerical superiority over the RAF, with approximately two thousand bombers and fighters to the RAF's five hundred fighters. It had not yet suffered a

"One left one's hotel in the morning to go out and die."

RAF Squadron Leader Peter Townshend

defeat or any significant losses. Its ranks were swelled with well-trained and battle-seasoned pilots and air crews. And it was facing a weakened, battered enemy struggling to regroup from its losses in France.

THE RAF: JULY 1940

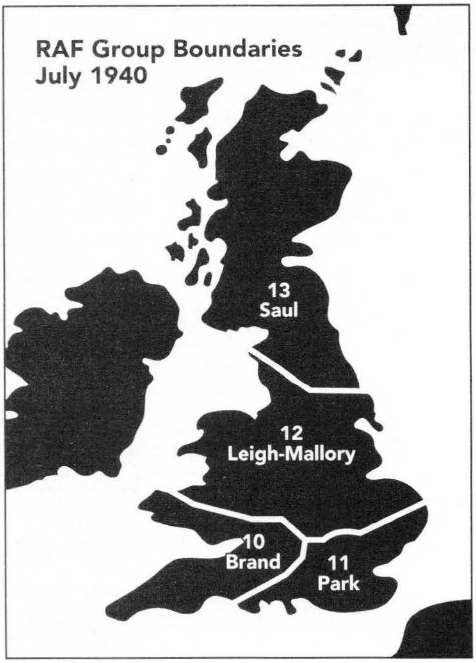
After the evacuation at Dunkirk, while Hitler and the Germans hesitated and debated their next move, the British quickly prepared for the invasion they felt would soon come. Barbed wire was strung along the beaches, barricades were erected, and signposts were torn down to confuse the invading German Army. Although most of the British Army was still intact, it had left scores of weapons on the beaches of France. Moreover, 25 percent of the British fighter aircraft force was destroyed on the Continent. Now, the war the British had been gradually preparing for since 1925 would be fought against a much stronger, better-equipped enemy.

Winston Churchill and his daughter watch the action overhead



The man most responsible for the defense of Britain from aerial attack was Air Chief Marshal Sir Hugh Dowding, head of Fighter Command, an organizational arm of the RAF created in 1936. Not only was Dowding in charge of the fighter aircraft defending Britain, but also the barrage balloons, which were attached to the ground by steel cables to ward off low-flying aircraft, the

Observer Corps, which watched the skies and noted aircraft movement, and the anti-aircraft guns.



Since 1936, when Dowding took over as head of Fighter Command, the number of fighter aircraft, squadrons, and airfields had steadily increased. In 1940, Fighter Command divided fighter coverage over Britain into four groups: 10 Group, 11 Group, 12 Group, and 13 Group. Of these, 11 Group was of the most strategic importance, since the territory it covered, Southeast England, was closest geographically to the Luftwaffe bases in France. Eleven Group was commanded by Air Vice Marshal Keith Park, a World War I veteran from New Zealand who had shot down twenty planes in that conflict. To the north of 11 Group was 12 Group, commanded by Air Vice Marshal Trafford Leigh-Mallory. To this group fell the task of protecting the industrial midsection of Britain, as well as providing a protective reserve of aircraft for 11 Group. North of 12 Group, and in charge of defending Northern England and Scotland, was 13 Group, headed by Air Vice Marshal Richard Saul. West of 11 Group, 10 Group protected Western England and was led by Air Vice Marshal Sir Christopher Quentin Brand. These four groups were divided into sectors, where various squadrons were based.

Since the standards for RAF pilots were extremely high and the training period long, there was a near-desperate shortage of fighter pilots. But Dowding refused to speed up the training process, and thus compromise the quality of future fighter pilots. Instead, "spare time flyers," pilots from the Royal Auxiliary Air Force and the Royal Air Force Volunteer Reserve, were added. In addition, volunteers from New Zealand, Australia, Canada, South Africa, and the United States, plus exiles from the conquered nations of Czechoslovakia, Poland, Belgium, the Netherlands, and France joined the RAF ranks. The refugee pilots, particularly the Czechs and Poles, possessed a burning hatred for the Nazis that would make them exceedingly daring and aggressive fighters in the weeks ahead.

The two fighter planes which served as the backbone of Fighter Command were the Hawker Hurricane and the Supermarine Spitfire, two fast monoplane

"Britain has become an island again!"

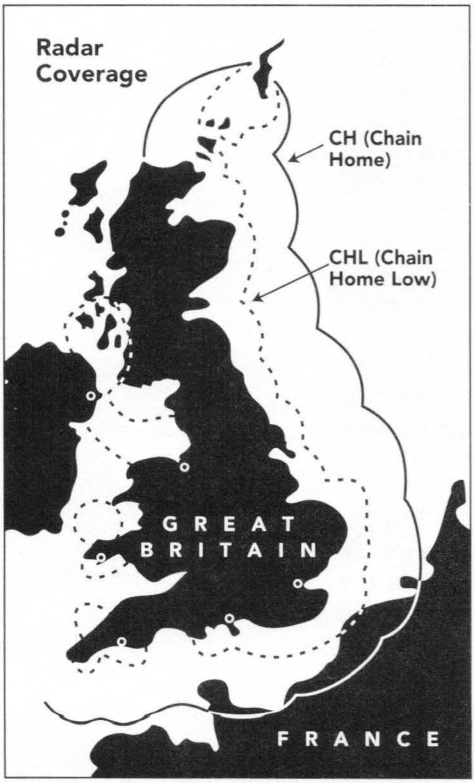
Robert Watson-Watt, after a successful experiment of the radio detection system

fighters. The Hurricane was the more abundant of the two, since it had been developed earlier. It was constructed of wood and fabric, covering a strong metal tube framework. As a result, it was less vulnerable to exploding cannon shells, and could be repaired rapidly on the ground even when it was severely damaged. The all-metal Spitfire was more agile than the Hurricane, and was the only British fighter which could confront the Bf 109 on equal terms. Fast and highly maneuverable, it was based on a radical, oval-wing design that was far ahead of its time. Several obsolete aircraft were also available to the RAF, including the Gloster Gladiator biplane, and the two-seat Boulton Paul Defiant, with turreted machine guns that could only fire to the rear. But it was with the Hurricane and the Spitfire that the hopes of the RAF rested.

And the British also had one other defensive weapon of note in their possession: radar.

THE DEVELOPMENT OF RADAR

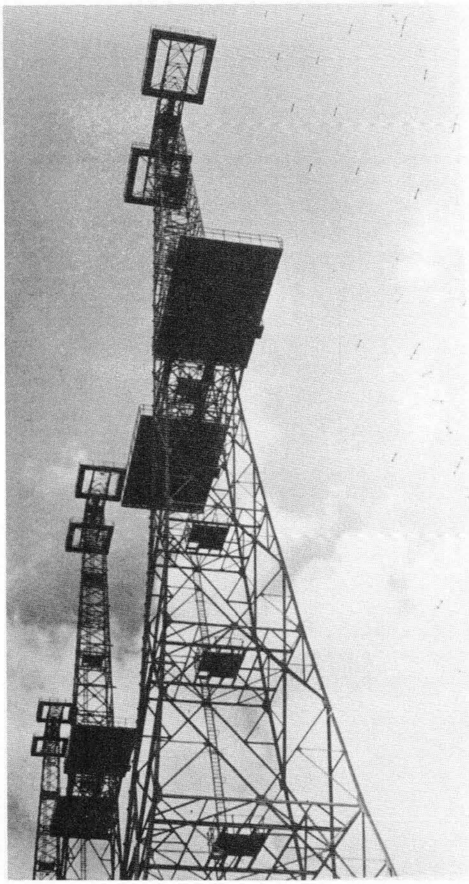
During World War I, the German zeppelin and Gotha biplane bombing raids on Britain were usually spotted by observers on the ground and fighter patrols in the air. But in the period between the world wars, a specialized type of aircraft known as the bomber was evolving in Europe. As the speed and bombload of the bomber increased, British politicians of the 1930s became increasingly worried. With Britain being so close to countries on the Continent, they envisioned a scenario where fast bombers would fly the short distance to one of Britain's major cities, and attack without being detected. With a shortage of planes and pilots, keeping round-the-clock fighter patrols airborne was next to impossible. Something else had to be done.



In the popular fiction of the day, a weapon called the "death ray" was frequently used to kill air crews and disable aircraft. The director of Scientific Research for the Air Ministry, H. E. Wimperis, felt it was only right to investigate whether such a weapon could actually be built. He asked Robert Watson-Watt, a radio expert at the National Physical Lab-

oratories, if the death ray stories had any validity. Watson-Watt believed that building such a ray was impossible, but perhaps by using radio waves, aircraft detection, not destruction, could be achieved.

At the time, a few scientists had known that radio waves reflected off metal objects, such as aircraft. Watson-Watt reasoned that a continuous transmission of these waves could be aimed in the direction of approaching aircraft. Then, the echo of the waves bouncing off of aircraft could be detected by a device located near the transmitter. This detection device had already been invented: it was the cathode ray oscillograph, which showed the transmission and reception of a radio wave with blips on a glass screen. Since the speed of radio waves is constant, by measuring the time it took for a radio wave to be sent out and reflected back, it would be possible to tell how far away the aircraft were.



Towers of the RDF system. Their open construction enabled many of them to withstand bomb explosions. *Courtesy of British Information Services*

In February of 1935, a crude version of this detection device was successfully tested, and by May, 70-foot-high radio transmission masts were being built along the British coastline. This early version of radar could not give the direction that the aircraft were coming from, but to deliberately mislead the Germans, the entire system was called "Radio Direction Finding" (RDF). In 1943, the word "radar," short for Radio Direction Finding and Ranging, became the accepted term for this kind of system.

By the time of the Battle of Britain, the RDF system was in place, and had been tested in both peacetime and wartime conditions. Though too bulky to be carried aboard planes, this early equipment proved to be a satisfactory additional pair of eyes for the RAF pilots.

From reception to interception, here is a brief outline of how the RDF system worked:

- When enemy aircraft took off from their bases and flew toward Britain, they were detected on the cathode ray tubes at the radar stations.
- Next, a phone call was put in to Fighter Command Headquarters in London, giving estimates on the altitude, position, and number of aircraft.



A radar operator watching the cathode ray tube at a radar station for signs of Luftwaffe aircraft. *Courtesy of British Information Services*

• In the Filter Room at Fighter Command, women plotters, wearing headphones, picked up this information relayed by the radar stations. Then, the women moved markers along a huge map using rakes. Each marker stood for a group of hostile or friendly aircraft.

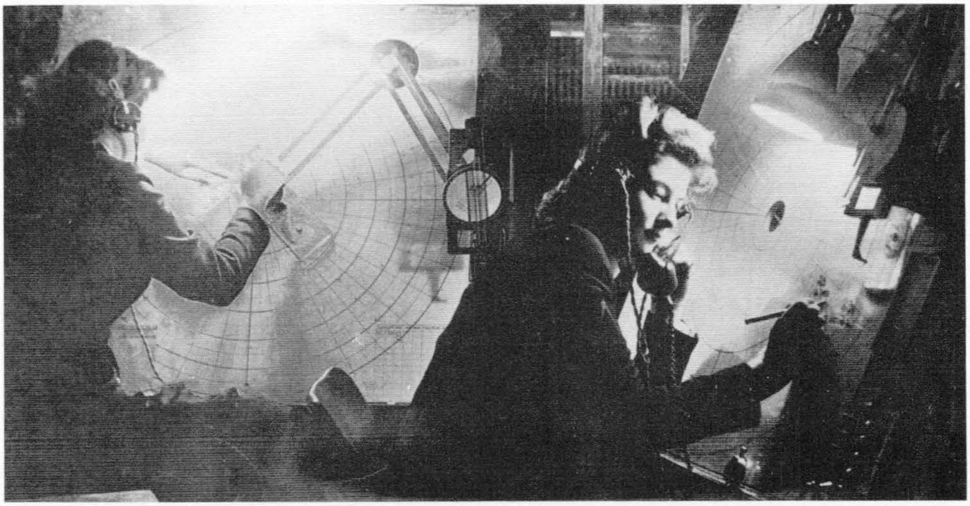
• Officers evaluated this information, then sent it next door to the Fighter Command Operations Room. At the same time, various Group Operations Rooms and Sector Operations Rooms also received the information. Each of these rooms had their own maps, plotters, and markers, and these maps were updated with the new information.

• The Duty Control Officer at each Group Operations Room watched the map, and decided which sector should intercept the incoming aircraft and how many fighters should be dispatched.

• The Sector Controller at each sector airfield ordered squadrons of fighters to intercept. If they were on the ground, they were ordered to take off; if they were already airborne, they were given the location of the incoming enemy over the radio, and guided to an interception point.

Crucial to the success of the whole system was a device aboard friendly planes that gave their location in the air. This High Frequency Direction Finding equipment, known as "Huff-Duff," consisted of a radio transmitter that automatically sent out a signal for fifteen

Inside a radar room, two women plot the location of incoming enemy planes



seconds of every minute. This signal was picked up by three Direction Finding Stations in each sector, and the information relayed to the Sector Controller. He determined the location of the RAF fighters, and directed them to intercept any incoming enemy aircraft. The information provided by Huff-Duff also removed the danger of the friendly aircraft being mistaken for enemy aircraft.

This early RDF network, called "Chain Home," was not without its drawbacks. Since the radio transmitters were all located near the coastline, the system could not be used once the incoming enemy planes passed by them. Instead, the Observer Corps had to make sightings from the ground and pass the information on to the various Operations Rooms. Also, the system could not detect low-flying aircraft, so a second network, called "Chain Home Low," had to be built expressly for that purpose.

Despite these limitations, the RDF system gave the RAF many advantages. Luftwaffe aircraft could now be detected as they assembled in the skies over Western Europe and flew toward their targets in Britain. Instead of wasting precious time and fuel flying on patrols searching for the enemy, the RAF pilots would now

"The first rule of all air combat is to see the opponent first."

Luftwaffe Major Adolf Galland



The Fighter Command Operations Room. Rakes were used to move aircraft markers across the huge map in the foreground. *Courtesy of the Imperial War Museum*

know where and when to attack, and could even rest between missions. The RDF system would prove to be a defensive asset that Fighter Command would desperately rely on in the weeks ahead.

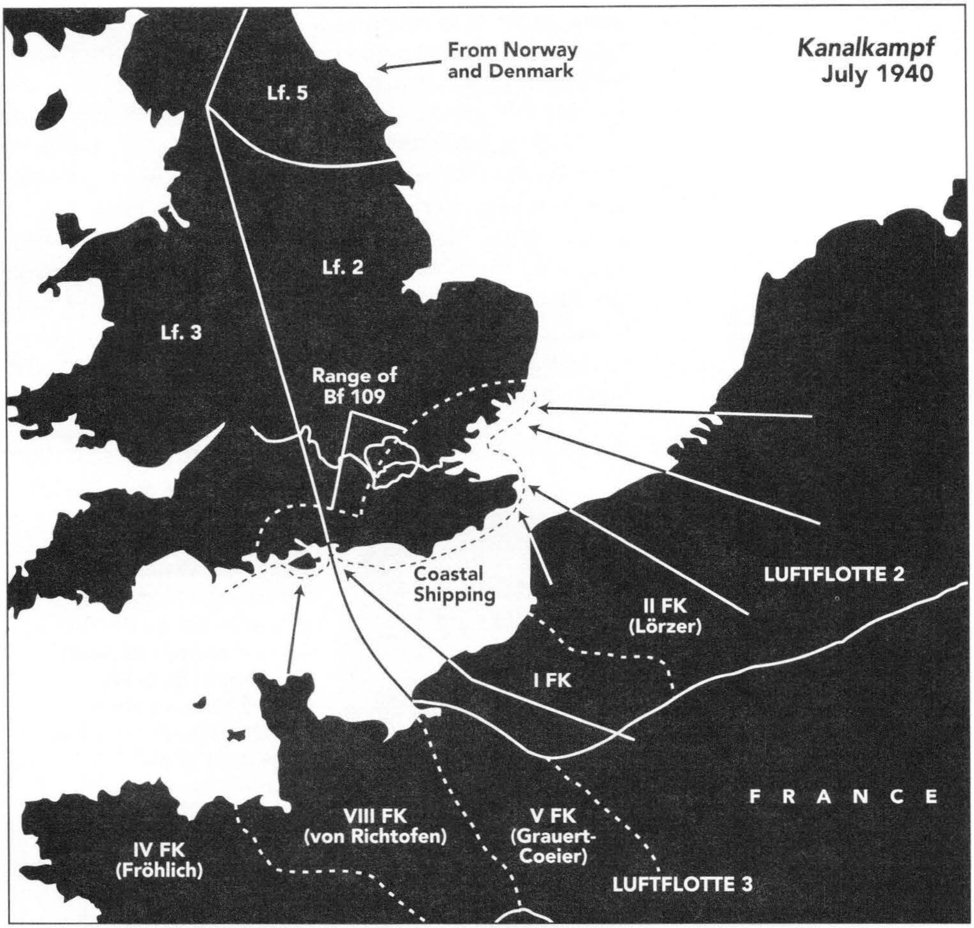
THE OPENING PHASE: *KANALKAMPF*

The German plan for the aerial assault on Britain called for an all-out attack by the Luftwaffe on the RAF fighter airfields. This was to be known as *Adlertag*, or Eagle Day, and would be launched when Hitler himself gave the order. Until Eagle Day, however, it was decided to attack domestic British convoys in the Channel, and draw out the RAF fighters who would surely come to their aid. The German name for these Channel attacks was *Kanalkampf*. If the strength of the RAF could be sapped in the *Kanalkampf*, it would make Eagle Day all the more effective. To lead the bombing attacks, Goering chose Oberst Johannes Fink, who was still flying bombing missions at the age of fifty. The fighter units were commanded by forty-eight year old Oberst Theo Osterkamp, or "Onkel Theo," who had shot down thirty-two planes in World War I, and remarkably, was fast becoming an ace in this new war.

In June and early July, German bombing attacks on the convoys were sporadic. But on July 10, radar stations began detecting a larger than normal formation of German aircraft gathering above Calais. As the twenty Do 17 bombers and their Bf 109 and Bf 110 escort fighters headed toward a convoy off the narrowest part of the Channel at Dover, they were met by Hurricanes from four different British squadrons. In the ensuing battle off what was later dubbed "Hellfire Corner," four Bf 109s and three Hurricanes were shot down, while one ship was lost from the convoy. This engagement would mark the beginning of the Battle of Britain.

The next day, a small convoy was spotted by ten Ju 87 Stukas and twenty escorting Bf 109s. Harassed by three Hurricanes, the Stukas dived down on the ships, only to be attacked by six Spitfires. The attack was broken off, though two Spitfires were shot down by the 109s. Later that afternoon, the coastal city of Portland was attacked by fifteen Ju 87s and forty escorting Bf 110s. Even though only six Hurricanes inter-

After being shot up by an RAF fighter, an He 111 headed back toward the English Channel. As it flew over an RAF base, the pilot spotted a flare path, and thought the flares were lights from ships at sea. While its crew prepared to ditch, the Heinkel made a wheels-up landing. As the surprised airfield control officer looked on, a door of the He 111 opened and a dinghy thrown out. Then, two of its crewmen, who had taken off their boots so they could swim better, dived out of the bomber — and on to the solid ground of the runway. According to rumor, they even climbed into the dinghy and started paddling.



cepted the attack, they swept past the slower 110s and shot down two of the Stukas. The intended coastal target was only lightly damaged.

For the next ten days, the Channel clashes intensified. At nighttime, the Luftwaffe would drop mines into British harbors and channels. In the daytime, German bombers, mostly Do 17s, Ju 87 Stukas, and Ju 88s, would attack convoys, along with airfields and other targets near the British coast. Despite the fact that their cargo, which was mostly coal, could have been moved across Britain by rail, the convoys continued to sail, mainly for reasons of morale. But Dowding refused to commit additional fighter protection to the convoys, since that would further weaken fighter coverage for the rest of Britain.

In the skies above the Channel, RAF losses were mounting at a frightening pace, with fifty fighters shot

down in the first ten days. One reason for this was the tight three-plane vic formation the RAF fighters were trained to fly in. Flying in this V-shape, wing tip to wing tip, British fighter pilots were often so preoccupied with avoiding collisions with each other that they had little time to search for the enemy. Grouped so closely together, they were also easier targets. German pilots, on the other hand, flew in a much looser formation known as the *Schwarm*, which they had developed in the Spanish Civil War. Instead of worrying about how close together the aircraft were, each fighter could cover a wide area while still being protected by the other three fighters in the group. Moreover, there was

HERMANN GOERING



The leader of the Luftwaffe during World War II, Hermann Goering was a German war hero during the First World War. A skilled fighter pilot who chalked up twenty-two victories, he was awarded Germany's highest decoration for valor, the Blue Max, and took over the Flying Circus following the death of the Red Baron, Manfred von Richtofen. After World War I, Goering became a barnstormer, and joined the Nazis in 1922, giving them some badly-needed prestige. A politically-adept man, he was unwaveringly loyal to Adolf Hitler, and in return was rewarded with titles, medals, and power as Hitler's second-in-command. When the Nazis took control of Germany in 1933, Goering created the Gestapo, organized the storm troopers, and set up concentration camps. He also took charge of creating the new air force, the Luftwaffe, at first in secrecy, then in open violation of the Versailles Treaty. The dynamic Goering built the Luftwaffe into the most potent air force in the world at the start of World War II. However, Goering, who liked to be called the "Iron Man," fell out of favor with Hitler when the Luftwaffe suffered a series of setbacks, starting with the Dunkirk evacuation of the British Expeditionary Force, which Goering had promised would be destroyed by the Luftwaffe. During the Battle of Britain, Goering made the decision to bomb London instead of RAF airfields, which cost the Luftwaffe dearly. Later, after Germany had invaded Russia, the German Sixth Army was encircled by the Red Army. Goering promised to support the beleaguered troops from the air, but instead only about 20 percent of the promised supplies got through, and the Sixth Army was eventually forced to surrender. As the tide turned against Germany, Goering heaped more and more blame for Luftwaffe failures on his pilots, while he, in turn, was distanced from Hitler. On May 8, 1945, Goering was captured by the Allies. Sentenced to death by hanging at the Nuremberg trials the following year, he insisted that he be shot like a soldier. When he was refused this request, he swallowed a poison pill that he had concealed for over a year, and died two hours before he was to have been executed.

no way the RAF pilots could compensate for the years of combat experience the Luftwaffe pilots possessed. In a one on one dogfight situation, the German pilots usually had the advantage, and only twenty-eight Bf 109 fighters were lost in the first ten days.

During the latter part of July, bad weather and poor visibility sometimes grounded the aircraft on both sides, and some convoys managed to get through the Channel unscathed. But overall, German attacks intensified, and by August 8, eighteen cargo vessels and four Royal Navy destroyers had been sunk in the *Kanalkampf.*

"The cruel thing about war in the air is that you rarely acknowledge the fact that you have killed a human. It blunts the senses."

Luftwaffe Oberleutnant Ulrich Steinhilper

In this opening phase of the Battle of Britain, each side was evaluating the other. The RAF fighter pilots were learning from their mistakes, and gradually began flying in looser, less rigid formations. Moreover, the aircraft on both sides had weaknesses which the opposition quickly learned about. For the British, the Boulton Paul Defiant fighter, armed with a three-quarter ton rear-firing turret, proved vulnerable to frontal attack, and many were lost in the first few weeks. For the Germans, the Ju 87 Stuka dive bomber was victimized not only by the much faster Hurricanes and Spitfires, but by anti-aircraft fire from ships as well. The twin-engine Bf 110 suffered from a lack of maneuverability when confronted by the smaller RAF fighters, and many a *Zerstorer* was shot down.

By early August, the tide of the battle had changed in favor of the RAF, even though German intelligence, which was to be faulty throughout the Battle of Britain, had reported the opposite. The Luftwaffe had actually lost 248 fighters and bombers to the RAF's 148 fighters in the *Kanalkampf.* The Germans also erroneously believed that all of the British fighter force had been used in the Channel conflicts. In reality, Dowding had wisely kept most of his fighters in reserve. German intelligence also reported that the Channel was closed, and the convoys had been stopped. But the British had finally decided to use rail to ship much of the cargo previously carried by convoys, which drastically reduced the number of ships needed. Restrictions were placed on those few convoys that did sail, so that they only approached Dover at night. However, the Channel was far from closed.

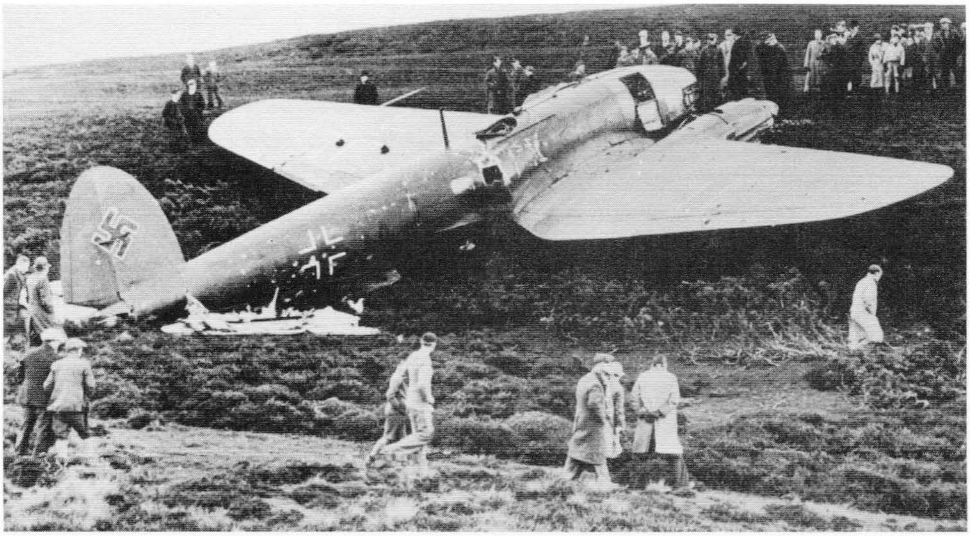
After a dogfight over the English Channel, Pilot Officer Tony Woods-Scawen was forced to crash-land his Hurricane on the Isle of Wight, knocking out his front teeth in the process. He then caught a ferry to Southampton, but arrived too late to rejoin his squadron. He made his way to a bar in a Southampton hotel, had a few drinks, and spent the night. The next morning, he telephoned his squadron, and told the adjutant, "If you want me to go on fighting, you'd better send someone down here to pay my bill."

On the British side, the loss of each fighter was keenly felt by the under-equipped RAF. The new minister of Aircraft Production, Lord Beaverbrook, feverishly stepped up fighter production, and nearly five hundred were produced in July alone. But replacing aircraft was a far easier matter than replacing experienced pilots, and the high pilot casualty rate was of crucial concern to Fighter Command throughout the course of the Battle of Britain.

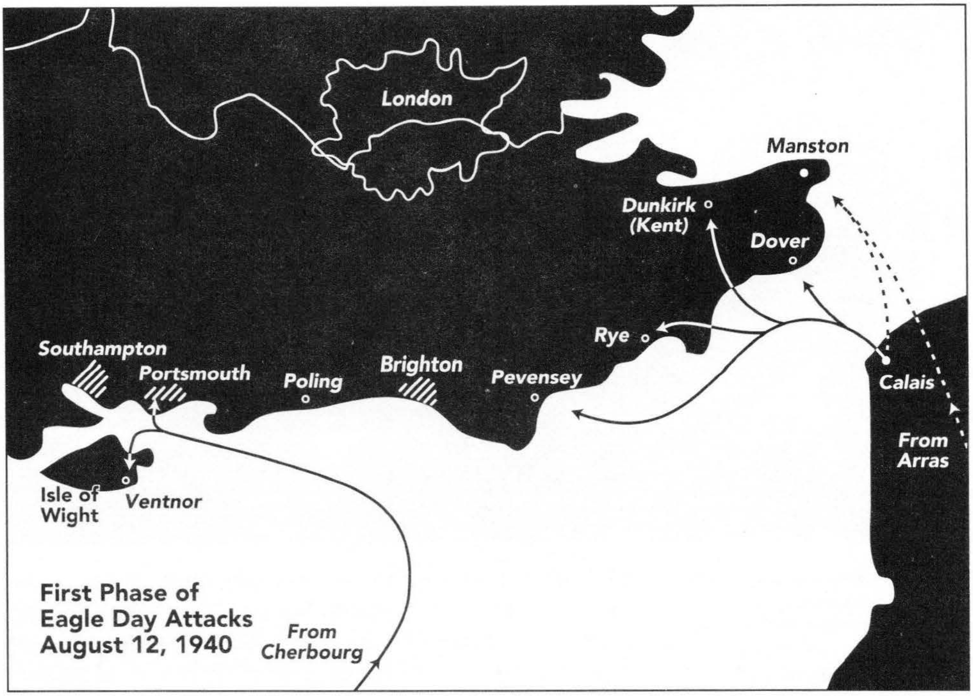
With winter weather arriving in a few months, the Germans decided to change their tactics. So far, the full power of the Luftwaffe had not yet been brought to bear on the RAF. Goering believed that a large-scale attack on the RAF fighter force would wipe out Fighter Command in four days, and the RAF itself could be destroyed in four weeks. With the skies clear of the enemy, the invasion could still take place in September, as planned. A German military conference was held at Hitler's Eagle's Nest headquarters on July 31 to discuss this knockout blow.

ADLERTAG: EAGLE DAY

On August 1, Fuhrer Directive No. 17 was issued from Hitler's headquarters. It read, in part, "I intend to intensify air and sea warfare against the English homeland...The Luftwaffe is to overpower the Royal Air Force...in the shortest possible time...The intensification of the air war may begin on or after 5 August. The exact time is to be decided by the Air Force after the completion of preparations and in light of the weather." The



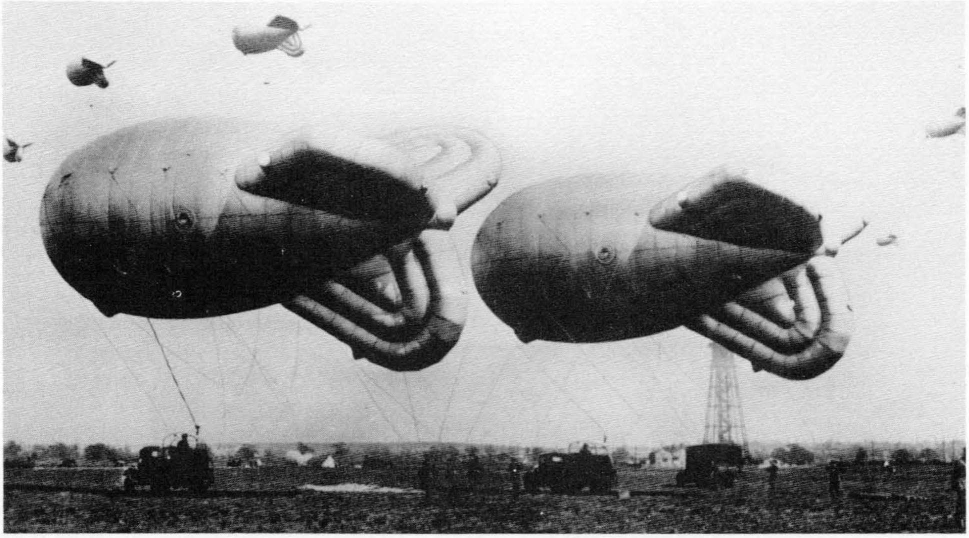
British civilians inspect a bullet-riddled He 111



First Phase of Eagle Day Attacks August 12, 1940

Luftwaffe was also ordered to participate in full force during the Operation Sea Lion land invasion. Hitler himself reserved the right to order terror bombing attacks on British cities. At last, after two months in limbo following the fall of France, the Nazi war machine could once again gear up for a major battle.

Goering met with his three Luftflotten commanders on August 5 at his headquarters near Berlin. There they formulated a plan they hoped would destroy Fighter Command's most important airfields in a single day, to be known as "Eagle Day." This operation was to have two phases. First, an attack would be made on targets along the coast, including the radar stations. German intelligence had underestimated how much the RAF relied on these stations, but the head of the Luftwaffe Signals Service, Generaloberst Wolfgang Martini, knew about radar and insisted that these stations be knocked out. The outcome of these preliminary raids would prove or disprove the usefulness of the RDF system. The second phase of attacks would come on the following day, Eagle Day. Luftflotten 2 and 3 were to launch a large-scale bombing attack on RAF airfields, which would destroy RAF fighters on the ground. Aircraft production factories, armaments factories, cargo and naval ships, harbors, and port facilities were also to be hit on



Barrage balloons being raised. They were anchored to the ground with steel cables, and often posed as much of a hazard to friendly aircraft as they did to enemy aircraft.

Eagle Day, and over the succeeding three days. Since the two Luftflotten needed about a week to prepare for Eagle Day, Goering decided that it would take place on August 10, when a stretch of good weather was predicted.

Luftflotten 2 and 3 had 929 fighters, 316 dive bombers, and 875 bombers between them. To combat all these aircraft, the RAF had a mere 675 fighters. Despite their overwhelming numbers of aircraft, the Luftwaffe was embarking on a mission that placed the burden of attack squarely on its shoulders, unlike previous encounters where it coordinated with the army. With a responsibility like this, the pressure on the men and machines would be incalculable.

Attacks on the British convoys continued, much as they had in July. On August 10, bad weather forced the postponement of Eagle Day until August 13. At 8:40 A.M. on August 12, phase one of the Eagle Day operation began as Experimental Group 210, a new unit of Bf 110s, took off from Calais. This group was made up of *Jabos* (fighter/bombers) that could drop bombs with pinpoint accuracy, then defend themselves as fighters. In a startling demonstration of just how effective the Bf 110 could be in this dual role, Experimental Group 210 attacked the radar stations at Dover, Dunkirk (Kent), Rye, and Pevensey, knocking out all but Dunkirk. With part of the RDF system gone, no RAF fighters were alerted, and Ju 87 Stukas attacked shipping off Kent without suffering any losses. One hundred Ju 88s, 120 Bf 110s, and 25 Bf 109s attacked ships in Portsmouth Harbor, and knocked the Ventnor radar station out of action.

That afternoon, the *Jabos* of Experimental Group 210, refueled and rearmed from their morning mission, assisted eighteen Do 17s in an attack on Manston airfield, and severely damaged this RAF base.

It was an extremely successful day for the Luftwaffe, even though they lost thirty-one aircraft, while the RAF lost twenty-one. But that evening, when Do 17s were sent to attack targets near Kent, they reported that signals from the radar stations were still being transmitted. Amazingly, the British had put three of the four damaged stations back into operation; only Ventnor remained off the air. The open girder construction of the huge transmission towers made them difficult to destroy by level bombing, and their 350-foot height inhibited dive-bombing.

The next day, August 13, Eagle Day, got off to an uncertain start when bad weather forced the postponement of the morning raids until the afternoon. Notice of the delay failed to reach Oberst Fink's group of seventy-four Do 17s, whose radios had been provided with the wrong crystals, and consequently could not pick up the

HUGH DOWDING



The one person most responsible for a British victory in the Battle of Britain, Hugh Dowding began his military career as an artillery officer. During World War I Dowding transferred to the Royal Flying Corps, and after the war served as a member of the Air Council, which governed the Royal Air Force. In his capacity as a research and development staff member, Dowding aggressively pushed for faster, more modern fighters and he supervised the development of the Spitfire and the Hurricane. When the RAF was reorganized in 1936, Dowding was appointed head of the newly-created Fighter Command arm, with the rank of air chief marshal. Dowding attracted controversy during the fall of France, when he would not commit additional fighter squadrons to help the French, fearing that losses would deplete fighter strength needed for the defense of Britain. From July to November 1940, he directed the British fighter defense against the Luftwaffe over Britain and the English Channel. During this time, despite pressure to send in large formations to engage the enemy, Dowding skillfully managed his fighters using smaller groups which could become airborne faster than the big wings. The large number of Luftwaffe aircraft shot down during the Battle of Britain proved that Dowding's choice of tactics was correct. With his crusty demeanor, "Stuffy" Dowding was never good at political gamesmanship, and though he had won the Battle of Britain, he lost a power struggle that followed. On November 25, 1940, Dowding was relieved of his position, and left the RAF two years later.

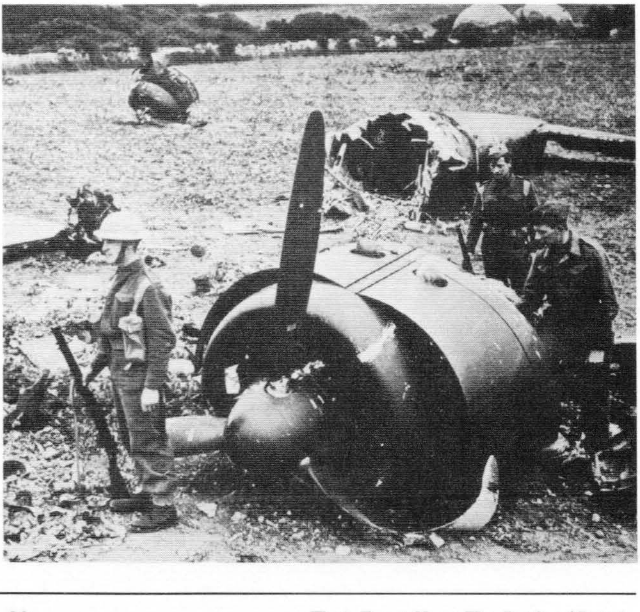
"From the very beginning the British had an extraordinary advantage which we could never overcome throughout the entire war; radar and fighter control. For us and our command this was a surprise and a very bitter one."
Luftwaffe Major Adolf Galland

radio wavelength announcing the postponement order. Fink's bombers flew to the Thames Estuary before encountering a small squadron of Spitfires; five Flying Pencils were shot down and four others were damaged. Although the remaining bombers hit their target at Eastchurch airfield, the aircraft they destroyed on the ground were Blenheim bombers, not the Hurricanes and Spitfires they had hoped for. Another group of Bf 110s did not receive the postponement order, and took off without the bombers they were supposed to escort. Six were shot down by Hurricanes above Portland.

By the afternoon of Eagle Day, even though the weather had further deteriorated, numerous attacks were launched on targets from Southampton to the Thames Estuary. In the day's most successful bombing mission, one hundred Bf 109s and eighty-six Ju 87s attacked Detling airfield unopposed, destroying twenty-two aircraft on the ground and killing sixty-seven personnel who were in the mess hall. The Short aircraft factory at Belfast and a Spitfire factory in Birmingham were also damaged by He 111s later that night.

But with the RDF system still in place and functioning, RAF fighters were intercepting the other incoming attackers. A group of Ju 87s, Ju 88s, and Bf 109s were near their target of Southampton when they were met by Spitfires; nine Stukas were shot down, though the Ju 88s damaged port facilities. Off Lyme Bay, nine Ju 87s were intercepted by Spitfires, and only three Stukas survived.

The wreckage of a downed Do 17 "Flying Pencil"



Although the Luftwaffe believed otherwise at the time, Eagle Day was a failure. Certainly it was not the resounding success that Goering had hoped for. The Germans had lost 46 aircraft from its 1,485 sorties, while the RAF had 13 fighters shot down from its 700 sorties. Of the forty-seven aircraft that the RAF lost on the ground, only one was a fighter. And while the Germans reported that eight Fighter Command bases had been destroyed, the bases that were bombed belonged to Coastal Command, and were not Fighter Command bases.

Nevertheless, when the day was done, the Germans celebrated, thinking they had shot down eighty-four RAF fighters and destroyed eight airfields. Believing that the RAF's 11 Group, which was in the thick of the action in Southern England, was now decimated, they reasoned that it was being reinforced with fighters from 12 Group and 13 Group to the north. To test this theory, the Luftwaffe decided to launch attacks from all three Luftflotten, including Luftflotte 5 in Norway and Denmark. If Fighter Command had, in reality, sapped the strength of the other groups to build up 11 Group, this multi-sided offensive would hit the British where they were most vulnerable — in Northern England and Scotland.

BLACK THURSDAY

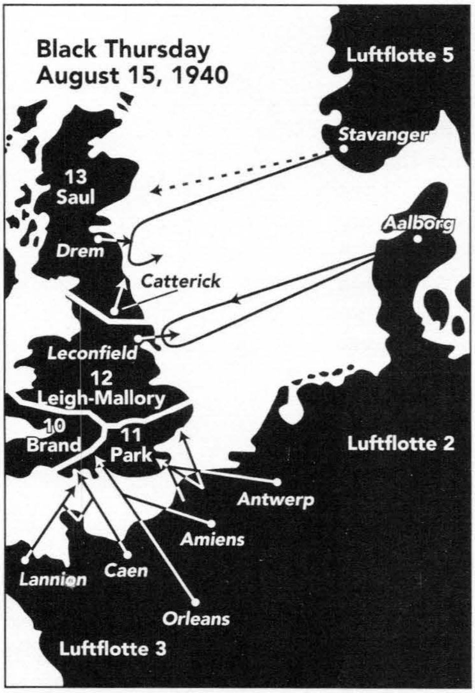
With clouds covering most of Britain, only a few scattered Luftwaffe raids were launched on August 14. The bad weather persisted the following day, and the aircraft from all three Luftflotten were grounded with the exception of two Ju 87 groups from Luftflotte 2, which did not receive the cancellation order. These Stukas bombed the airfields at Lympne and Hawkinge, and at least two were shot down. But by midmorning, the weather had cleared, and what was to be the largest German offensive of the Battle of Britain was launched.

Generaloberst Stumpf, commander of Luftflotte 5, decided on a risky two-pronged strategy. A group of twenty He 115 seaplanes from Norway would fake an attack on targets in the Firth of Forth in Scotland. This would hopefully draw any defending 13 Group fighters north, away from the main attacking force of seventy-two He 111s and twenty-one Bf 110s also from Norway. These aircraft were all equipped with extra fuel tanks to make the 1,100 mile round trip across the North Sea, and the Bf 110s were even forced to fly without a rear gunner to save weight.

As the fighting intensified, British pilots found themselves flying sortie after sortie with little rest in between. After one engagement, a Spitfire landed at a squadron airfield and taxied to a stop. When no one got out of the aircraft, ground staff rushed to it, thinking that the pilot was dead or wounded. Instead, when they got to him, they found him slumped over the controls, fast asleep.

As they approached the coast of Scotland, the decoy seaplanes were spotted by northern RAF radar stations, and nearly forty Spitfires were sent to intercept them, just as Stumpf had planned. Unfortunately, Stumpf's deceptive tactic went awry when the main bombing force made a serious navigational error that put them in roughly the same area as the decoys. When the He 111s and Bf 110s reached land, they too were met by Spitfires. In the ensuing battle, seven Luftwaffe bombers and eight fighters were shot down, while one RAF fighter was lost.

To the south, a second Luftflotte 5 attack had been launched across the North Sea from Denmark. The attack force of fifty Ju 88 bombers were unescorted, relying on their speed and their gun-firepower to get them through. The bombers headed for Driffield, in Central England, which was covered by 12 Group. Trafford Leigh-Mallory, the commander of 12 Group, was an advocate of the "big wing," or a coordinated group of three to five squadrons of fighters massed together to attack the enemy. On this day, however, he reacted timidly. The big wing did not materialize, and only twelve Spitfires and six Hurricanes intercepted the German bombers. Seven Ju 88s were shot down, but ten British bombers were destroyed on the ground, along with an ammunition dump.



The Luftwaffe was more successful in the southeast, where Luftflotten 2 and 3 hit and damaged numerous airfields, although few were Fighter Command bases. The Short aircraftworks at Rochester was also bombed by thirty Do 17s, and the redoubtable Experimental Group 210 destroyed a Hurricane base at Martlesham Heath. Later that afternoon, Experimental Group 210 bombed the training station at Croydon, destroying thirty-six training planes and killing sixty-two personnel, but they themselves lost their commander and five aircraft.

Despite these successes, August 15 would go down in history as another day of frustration for the Luftwaffe, as nearly every raid had been intercepted by the RAF. In all, seventy-five German aircraft were lost, and 20 percent of the attacking Luftflotte 5 aircraft had been

shot down, while the British lost thirty-five fighters in the air. These heavy losses on what the Germans were now calling "Black Thursday" proved to the Luftwaffe that the British were not depleting their northern squadrons to help the beleaguered 11 Group.

A CHANGE OF STRATEGY

The following day brought with it new orders from Goering to the Luftwaffe. He had decided that attacks on coastal radar stations were fruitless, and further attacks were forbidden. In addition, since bomber losses were mounting, Bf 109s were ordered to provide



Bf 110 *Zerstorers* in flight over England

close support for the bombers instead of flying freely over Britain searching for RAF fighters. This order was adhered to reluctantly by the Luftwaffe fighter pilots, who had enjoyed much success in the free-chasing role. August 17 saw only light fighting, but on August 18, the Luftwaffe attacked and damaged the airfields at Biggin Hill, Croydon, Kenley, Gosport, and Manston, losing seventy-one aircraft, including thirty Ju 87 Stukas, to the RAF's twenty-seven. Bad weather limited the action for the next few days, and both sides used the break to rest their men and evaluate the lessons learned from the weeks of furious fighting.

"I was up the stairs scrubbing the top floor, the next thing I knew I was lying in St. James's Street, so I just picked myself up and walked away."

Mrs. Emily Foster, a resident of the frequently-attacked town of Dover

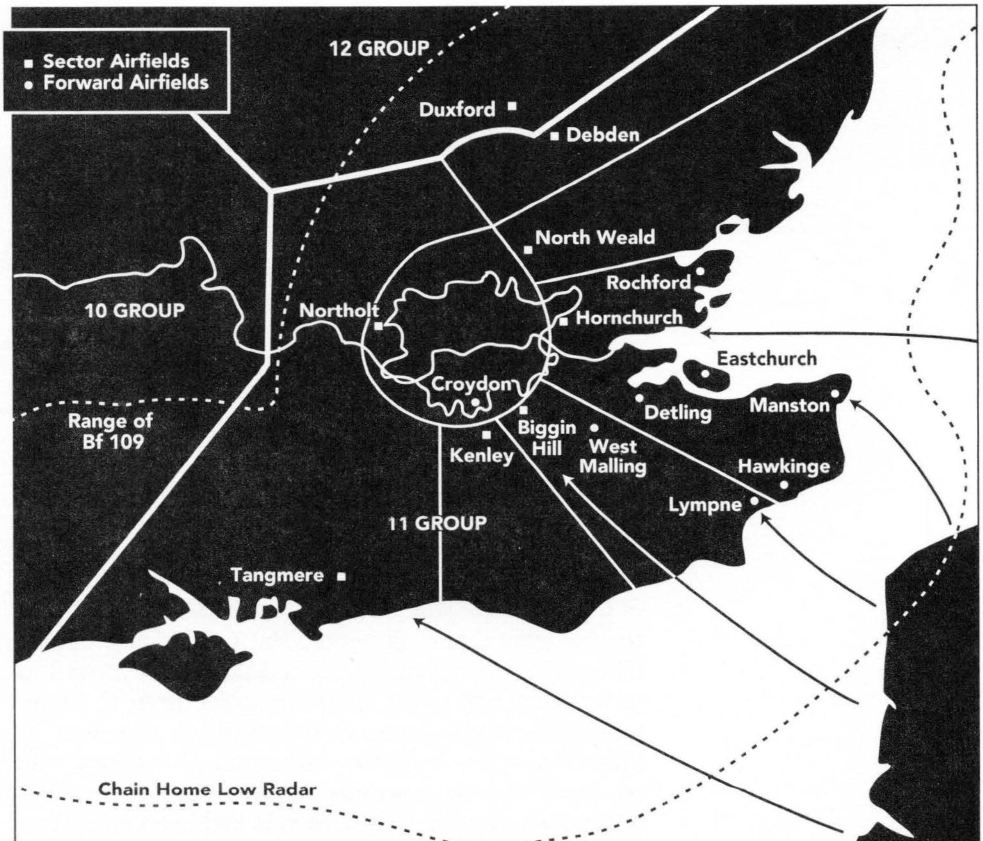
On the British side, Commander Park of 11 Group held a staff conference on August 19, where several tactical items were discussed. First, it was decided that the RAF fighters would intercept the Luftwaffe bombers as soon as possible. They could not waste time for a big wing to form; such a tactic was better suited for 12 Group, whose geographic location allowed more time for these large formations to assemble. On this issue, Park was fully supported by Dowding. Second, several squadrons would patrol the skies above airfields, instead of leaving each airfield to search for the enemy itself. Third, fighter to fighter combat was to be avoided, and fighters were to concentrate on shooting down bombers. This would draw the German fighters to the same altitude as their bombers, making them better targets.

On the German side, it was decided to phase the Ju 87 dive bomber out of combat actions against Britain. Since their fighter escort planes lacked dive brakes and could not stay with them while diving, the Stukas were virtually defenseless after they pulled out of their dives. As a result, they were an easy mark for the British fighters, and Ju 87 losses had increased dramatically during the past several weeks. It was also determined that the Bf 110, while successful as a fighter/bomber, was inferior for fighter escort. In the action over England and Scotland, Bf 110s were forced to fly in a defensive circle, with one aircraft using its tremendous forward firepower to cover the vulnerable rear of another. It was hardly a tactic that could provide adequate protection for the bombers. From now on, *Zerstorers* themselves would be escorted by Bf 109s, thus giving rise to the paradoxical situation of fighters escorting fighters! In large groups, they would now go only as far as the limited range of the Bf 109 — which meant Southern England.

Most important, however, was the decision to give top priority to a single objective: destroying the RAF's fighters. Only one aircraft in the Luftwaffe's arsenal was capable of taking on the Spitfire and Hurricane: the Bf 109. All of the Bf 109s from Sperrle's Luftflotte 3 were to be transferred to Kesselring's Luftflotte 2, and based at Pas de Calais — the closest geographic point to Britain. There their limited range would be less of a problem. And from now on, a larger number of

"In those days, all the loud-speakers from the army stations of most of the occupied countries blared out the song: 'Bomben auf En-ge-lund.' By beating the big drum in strong and martial rhythm and blending it with the roar of aircraft, they expected a mass psychological effect. We pilots could not stand this song from the very start."

Luftwaffe Major Adolf Galland



The Crucial Phase: Attack on Airfields
August 24 to September 6, 1940

attacks — both by day and by night — were to be launched, with smaller formations of bombers and escorting fighters. The bombers were to attack targets within the range of 11 Group's bases, particularly around London where the bases were more numerous and more vital. If these attacks destroyed British fighters on the ground, fine, but their main purpose was to force the fighters to take to the air. There they would be dealt with by the Bf 109s.

It was this new strategy that nearly won the Battle of Britain for Germany.

THE CRUCIAL PHASE

By August 24, the weather had cleared, and the Luftwaffe attacks began again. This time, the Germans were also armed with an important piece of information. For the past several weeks, all RAF radio transmissions had

been monitored. As a result, the Luftwaffe now knew which airfields were of the most importance to Fighter Command, and gave these airfields top priority as targets.

Now, as the formations of Luftwaffe bombers and fighters headed toward Britain, the RDF system was having trouble figuring out where they were going to attack. There were more and more small formations to pick up, and plotting became increasingly difficult. Moreover, several large fighter formations flew up and down the Channel, constantly threatening to move inland and attack, which further confused radar personnel. Then, at 3 P.M., the real attacks began, as bombers struck the airfields at Manston, Hornchurch, and North Weald, plus ships at Portsmouth.

Park's 11 Group fighters were largely unsuccessful at penetrating the thick German fighter screen. With his squadrons depleted, Park asked 12 Group to cover Hornchurch, North Weald, and Debden airfields north of London. Here was a chance for Leigh-Mallory to test the big wing theory in action. But on this day, assembling the large formation and coordinating it proved to be a failure, and only a single squadron from 12 Group made it to North Weald as the Germans attacked. To make matters worse, this squadron of Spitfires was equipped with an experimental cannon which frequently jammed after only a few rounds had been fired. As a result, these Spitfires were rendered virtually useless against the incoming aircraft, and by the time the rest of

JOSEF FRANTICEK

Surprisingly, the leading RAF fighter pilot in the Battle of Britain was not from Britain, but from Eastern Europe. Josef Franticek was a Czech airman who ended up in Britain after a long journey through Europe. First, he had piloted a plane to Poland after Germany invaded Czechoslovakia, and joined the Polish air force. Sergeant Franticek fought for three weeks against the Luftwaffe, and when Poland fell, he left for Romania. After being captured and escaping from an internment camp, he made his way through the Balkans to the Middle East, and then to France. Again Franticek fought against the Luftwaffe, this time with the French air force, who awarded him the Croix de Guerre for shooting down several enemy aircraft. When France fell in June of 1940, Franticek made his way to Britain, where he was assigned to a Polish RAF squadron as a "guest." Flying a Hurricane against the Luftwaffe in the Battle of Britain, he recorded seventeen confirmed kills. Franticek was a skilled pilot but had a lack of air combat discipline, and he operated best when left alone to do what he pleased — which usually meant chasing after Luftwaffe aircraft by himself. On October 8, 1940, Sergeant Franticek was reported killed in action after he failed to return to his base.

12 Group's fighters finally made it to Hornchurch and North Weald, both airfields were a shambles.

That evening the bombing continued, with 170 bombers attacking a variety of targets from Kent to the Scottish border. But in the early hours of August 25, an incident occurred that would have a direct impact on the Battle of Britain. A lone He 111, trying to locate oil tanks at Thameshaven by flying up the Thames Estuary, went too far west and dropped its bombload over Central London. Although parts of Greater London had been hit in earlier missions, the city center was deemed off limits by Hitler himself. Nevertheless, it had now been bombed, albeit by one misguided aircraft.

Later that morning, Churchill ordered RAF Bomber Command to launch a retaliatory raid on Berlin. On the night of August 25, eighty-one British Hampden bombers, on a mission of propaganda more than of military importance, headed for the German capitol. Goering himself had boasted that such a raid would never happen, once joking that "You can call me Meyer" if it ever occurred. Now, as bombs rained down on Berlin, people called Goering this very name, which was most insulting to the anti-Semitic leader. After the raid, which did little damage, Goering promised Hitler that Berlin would never again be bombed. But back in London, Churchill was ordering additional raids and waiting for a reaction from the German leaders.

Not all of the pilots who flew, fought, and died in the Battle of Britain were British. The following chart lists all the different nationalities of the men who flew for the RAF in the summer of 1940.

	Men who took part	Men killed
United Kingdom	2,543	418
Poland	147	30
New Zealand	101	14
Canada	94	20
Czechoslovakia	87	8
Belgium	29	6
South Africa	22	9
Australia	22	9
Free France	14	0
Ireland	10	0
United States	7	1
Southern Rhodesia	2	0
Jamaica	1	0
Palestine	1	0
TOTAL	3,080	515

Both sides were quick to realize that the new Luftwaffe tactics were working extremely well. Although the newly-restrained fighters were recording fewer kills, the new, tighter Luftwaffe formations were enabling the bombers to get through to their targets. Many Fighter Command airfields, especially the important ones around London, had been hard hit, and the British had no adequate defense for night bombing. The attacks continued, with up to seventeen hundred sorties a day, interrupted only by bad weather.

On August 26, the RAF bases at Hornchurch and Debden were bombed when, once again, Leigh-Mallory's 12 Group fighters failed to cover these airfields for 11 Group. On August 28, daylight attacks were stepped up, and that night industrial targets in Liverpool were

blasted by 160 bombers. August 30 saw thirteen hundred Luftwaffe sorties, and when a German bomb knocked out the electricity for seven radar stations, waves of aircraft flew toward their Fighter Command targets unimpeded by RAF fighters. Kenley, Tangmere, Rochfort, and Shoreham airfields were badly damaged, and Biggin Hill was hit in two separate raids by Bf 109 fighter/bombers and Ju 88s. The next day, there were even more Luftwaffe sorties against the airfields, including He 111s bombing Biggin Hill again, while Do 17s, adopting a new tactic of bombing targets from a low altitude, hit Croydon. The Luftwaffe shot down thirty-nine Fighter Command aircraft, the heaviest toll for a day since the Battle began.

Meanwhile, across the Channel, preparations were well underway for the invasion of Britain. Twenty-five thousand German troops were stationed at bases all along the Channel coast, from the Meuse River to the Seine, awaiting the go-ahead for Operation Sea Lion. Hundreds of barges and transports were scattered at various coastal ports, along with thousands of vehicles and horses. In Berlin, Hitler met with his advisors to discuss Sea Lion and possible retaliatory action for the Berlin raids. He picked September 10 as the date he would make a decision on when to launch the invasion. Obviously, that depended on establishing air superiori-

A frequent sight at airfields in Southern England in 1940 — Hurricane pilots racing toward their fighters



ty over Southeast England, but as of September 1, that prospect was looking more and more like a certainty. As for retaliation, attacks on British cities, including London, were to begin as soon as possible.

Back at Fighter Command, the situation was perilous. During the two weeks from August 24 to September 6, 466 RAF fighters were destroyed and replaced by only 269 fighters. The RAF was now losing fighters at a higher rate than they were receiving new or repaired ones, which meant that Fighter Command would soon be totally depleted. The high loss of pilots was an even more serious issue. Since the Battle of Britain began, 80 percent of Dowding's squadron commanders had been killed or wounded. In all, 409 pilots had been killed or wounded in the month of August, and 231 — nearly a quarter of Fighter Command's strength — were lost between August 24 and September 6 alone. To replace them, Dowding decided to allow two hundred foreign pilots, mostly Czechs and Poles, to join the fighting. Additionally, pilots from Bomber, Coastal, and Training commands were rushed through Fighter Command training, and many were sent into battle with only a few hours of experience in flying a Hurricane or a Spitfire. This proved to be disastrous and diluted the overall effectiveness of the squadrons. Those few surviving experienced pilots found themselves flying as many as seven sorties a day, and the strain on them was immeasurable.

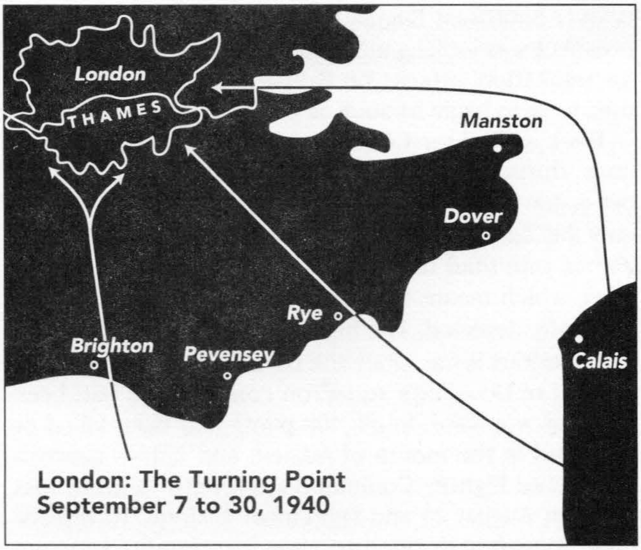
"On August 8 the RAF Fighter Command took off to save everything, and between then and the end of September they saved it."

General "Hap" Arnold, USAAF

This intense fighting was also having an effect on German pilots, particularly those flying the Bf 109s. Even though Kesselring's Luftflotte 2 fighters were flying across the narrowest part of the Channel, Bf 109s were still hampered by their limited range. Many a Bf 109 was forced to splash down in the Channel, or crash-land on a beach in France, out of fuel. In addition, some fighter units were flying up to five sorties a day across the Channel, and the men were pushed beyond their limit.

Yet there was no arguing that the Luftwaffe was finally turning the tide of the Battle of Britain in its favor. Losses on both sides were about even, which was acceptable to the Germans because they had more planes to lose. For the first time, British losses were actually higher than theirs on some days. All the major 11 Group airfields except for Tangmere

In one of the most successful Luftwaffe sorties of the Battle of Britain, a pair of Ju 88s flew to Brize Norton airfield near Oxford. Timing their attack so that the RAF fighters would be on the ground refueling and rearming, the German bombers approached the airfield as if about to land there, in hopes that they would be mistaken for British bombers. They even lowered their landing gear. Then, they dropped their bombs, destroying forty-six aircraft and damaging eleven others. The two bombers made it back to their base without being intercepted.



London: The Turning Point
September 7 to 30, 1940

and Kenley were badly damaged and some were no longer operational. And German intelligence now estimated that fewer than three hundred Fighter Command aircraft remained. On September 3, Goering ordered his Luftflotten commanders to The Hague for a conference. A timetable for Operation Sea Lion had been issued from Hitler's headquarters stating that the invasion fleet would sail on September 20, and invade Britain on September 21. Goering and his generals had little time to waste. Now, they gathered to plan the knock-out blow that would finish off Fighter Command once and for all.

LONDON: THE TURNING POINT

At the September 3 conference, two of Goering's Luftflotten commanders had a major difference of opinion on how to finally bring the British to their knees. Kesselring, believing both the reports of German intelligence and his pilots, stated that Fighter Command was nearly finished and could barely muster a hundred fighters in defense of Britain. The time was right to hit London hard, and force any remaining RAF fighters into the air to be destroyed by the superior numbers of Luftwaffe aircraft. Then, the British would either have to negotiate for peace, or suffer the consequences of an invasion. Sperrle, whose Luftflotte 3 aircraft were mostly flying bombing missions across the wider part of the Channel and meeting stiff resistance, disagreed. He believed that Fighter Command still had over one thousand aircraft, and that the attacks on the British airfields should continue. (In reality, the actual RAF

fighter strength numbered around seven hundred.)

The optimistic Goering, armed with an intelligence report that put Fighter Command losses since August 8 at 1,115, sided with Kesselring. Time was running out for Operation Sea Lion, and if the Luftwaffe attacked London, Goering felt that every available RAF fighter would be ordered aloft to protect the British capitol and the Bf 109s could make fast work of them. Since Hitler had lifted the ban on bombing London after the attacks on Berlin, full-scale raids could begin with the Fuhrer's blessing. The next day, in a speech in Berlin, Hitler stated that "When they declare that they will increase their attacks on our cities, then we will raze their cities to the ground!"

For the next few days, the Luftwaffe attacks on Fighter Command airfields continued as usual. But on the afternoon of September 7, 625 bombers and 648 fighters were sent across the Channel to bomb London. As the aircraft assembled over France, the formation was nearly 2 miles high and covered 800 square miles. As it

LORD BEAVERBROOK



One of Winston Churchill's key appointments after he took office in 1940 was Maxwell Aitken, Lord Beaverbrook, to the newly-created post of minister of aircraft production. Nicknamed "The Beaver," this Canadian-born newspaper tycoon was a pacifist before the war, but after his appointment he energetically tackled the huge problem of bolstering aircraft production to fight against a numerically-superior Luftwaffe. Described as "an arch-hustler," and "the yeast in the dough of British life," he gave himself near-total control over what types of aircraft would be produced, and how many. He decided to step up fighter production at the expense of bomber production, and when he organized scrap metal drives, thousands of pots, pans, kettles, and even bathroom fixtures and vacuum cleaners flooded in. Though little of the metal was actually used for aircraft construction, these scrap drives did wonders for the morale of the British people. Beaverbrook's efforts turned the faltering British aircraft production industry around, and by the time the Battle of Britain began, nearly five hundred Hurricanes and Spitfires were being turned out every month, about a hundred more than the Germans were producing at the time. The energetic Beaverbrook was also head of the Civilian Repair Organisation, which repaired and cannibalized damaged aircraft; this group became so efficient, it produced one-third of the "new" aircraft during the Battle of Britain. Later, Beaverbrook negotiated Lend-Lease agreements with the Russians, and also served as minister of supply.

"It is sensible to be afraid of real danger. If you can't avoid real danger it is sensible to take cover."

Dr. Edward Glover, director of the London Clinic of Psycho-Analysis

neared the English coast, the RDF plotters and Observer Corps quickly realized that something was different — the small, carefully coordinated attack formations of the past two weeks had been replaced by two huge waves of aircraft. One formation headed for the dockyards of the Thames Estuary, while the second flew toward London itself. Bombs rained down on the Royal Arsenal at Woolwich; the Commercial Docks; the Millwall docks; paint, timber, and rum warehouses; oil storage tanks; and the impoverished residences of London's East End. The bombing continued into the night for seven hours, and over three hundred tons of bombs were dropped, leaving the London dockyard area and the East End engulfed in flames. Four hundred and forty-eight Londoners were killed and nearly one thousand more were wounded in the raid. Although Hurricanes and Spitfires did manage to bring down forty-one German aircraft, most of them were intercepted on their way back to the Continent, after they had dropped their bombloads. In turn, Fighter Command lost twenty-eight aircraft.

But Air Vice Marshal Park, circling the burning city in his Hurricane, saw a sign of deliverance in the devastation. "Though I felt very angry," he later wrote, "I said 'Thank God,' because I realised that the methodical Germans had at last switched their attacks from my vital aerodromes on to cities." For the first time in weeks, the Luftwaffe had left his battered airfields alone. With this respite, they could be repaired, and more Hurricanes





London after a Luftwaffe bombing attack

and Spitfires could then be sent aloft to engage these new enemy formations.

The next night, the Luftwaffe made another raid on London, and 412 people died in the bombing. But on September 9, when a large two-pronged Luftwaffe formation was launched to repeat the successes of the daylight raid of September 7, 11 Group was ready for it. Park had moved several of his squadrons toward the coast, where they could better intercept the incoming formations. Ten Group and 12 Group were also called in to cover 11 Group's airfields. The first Luftwaffe formation was met by such stiff resistance that it was forced to jettison its bombs near Canterbury. The second formation was forced away from its intended target, the dockyard area of London, and in the fierce fighting, it scattered bombloads throughout London and the surrounding countryside. Fighter Command lost nineteen aircraft, while twenty-eight Luftwaffe planes were shot down, several by a big wing from 12 Group. Led by legless pilot Douglas Bader, these Hurricanes had disobeyed orders to cover 11 Group's airfields, and attacked the bombers over London instead.

The failure of this raid disturbed the Germans. Obviously, Fighter Command was still functioning despite

intelligence reports to the contrary. On September 11, a small daytime Luftwaffe raid was also rebuffed by British fighters. Although bad weather cut back on the daytime raids, the night raids continued all week. For the next sixty-eight successive nights they would continue, a period later known as "The Blitz." Some two thousand Londoners were killed and ten thousand were wounded in the first week's raids. But the RAF fighters as yet had no airborne radar, and could not find the enemy aircraft in the dark to engage them. So while London was reduced to rubble, these raids did not flush out Fighter Command aircraft as the Germans had hoped.

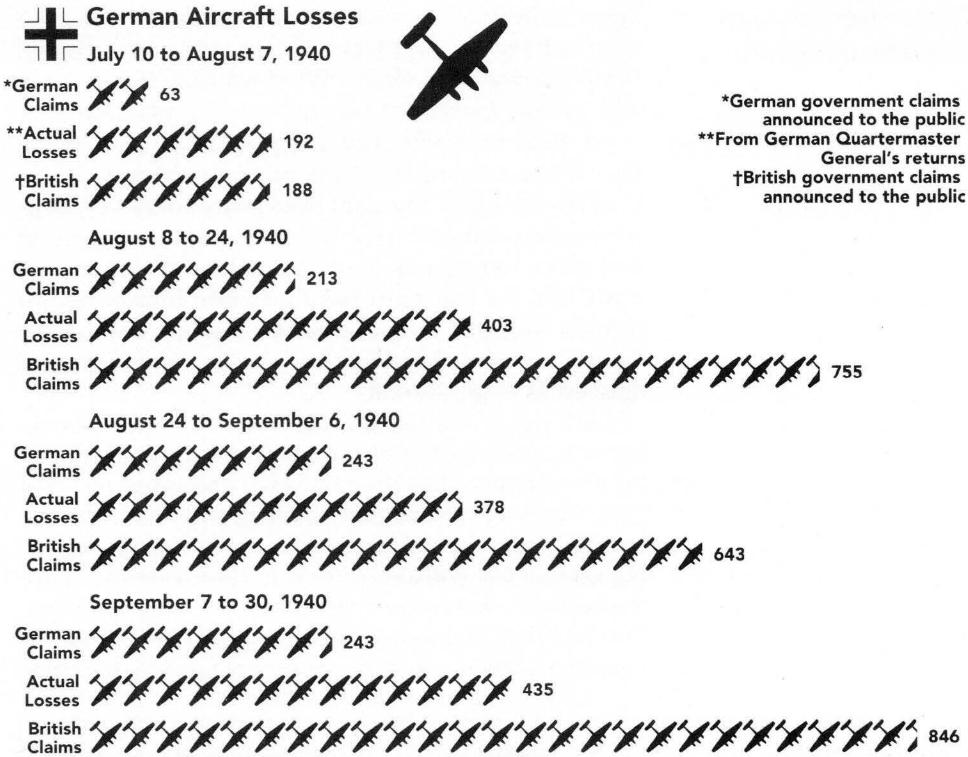
On September 14, Hitler gave Goering until September 17 to clear the skies of British fighters. With the scheduled invasion only eight days away, Goering decided to launch every available German bomber and fighter in one all-out effort that would finally decide the Battle of Britain.

SEPTEMBER 15: BATTLE OF BRITAIN DAY

Dawn broke on a clear autumn day, with only a few patches of clouds. In the early morning hours, the RDF screens showed no enemy aircraft. Then, around 11 A.M., the radar stations picked up a large formation of aircraft assembing over France at an altitude of 15,000 to 20,000 feet. At 11:30, the formation of four hundred fighters, protecting only one hundred Do 17 bombers, began to move toward Britain. Gone were the preliminary feint attacks designed to lure Fighter Command aircraft up into the air before the main Luftwaffe attack. This time, everything was out in the open.



Putting out fires during "The Blitz" of London



Fighter Command was ready to fight back with nearly everything it had. Park had some two hundred fighters at his disposal, including one squadron from 10 Group, and five from 12 Group in a big wing. The first interception was made above Canterbury around noon, and soon the skies above Southeast England were filled with vapor trails from dogfights. As the Spitfire squadrons tangled with the fighters, the bombers droned on toward London unprotected. Park sent ten squadrons aloft to take on the bombers. Without the Bf 109s, the German bombers were easy marks for the Hurricanes. Their formations broken and scattered, many Do 17s jettisoned their bombs well before they reached their target. The main formation made it to Greater London, and bombs fell randomly on the districts of Tooting, Kensington, Westminster, and Clapham. Even Buckingham Palace was hit. But the main targets were only lightly damaged, and many Do 17s fell from the sky in flames.

Watching the battle take shape on the giant Operations Map at the Uxbridge headquarters of 11 Group was Churchill. He watched as, one by one, the bank of

"Never was so much owed by so many to so few."

Winston Churchill

lights indicating the number of squadrons in reserve went out. For the first time since entering the complex, Churchill spoke to Park. "What other reserves have we?" asked Churchill. "There are none," replied Park.

At that moment, the height of the battle, 23 squadrons, totaling 370 fighters, were airborne. More than anything else, the sight of so many aircraft came as a tremendous shock to the Germans, who had been told that there were fewer than fifty Fighter Command aircraft left. As the battered Luftwaffe bombers and fighters struggled back toward the Channel, their crews were convinced that Fighter Command was far from finished as a fighting unit.

Luck was on the British side that day, for the launching of a second wave of Luftwaffe aircraft was delayed until two hours after the first wave had taken off. This gave Park's squadrons time to refuel and rearm. As this second wave of bombers neared the East End, Bader's big wing of five squadrons from 12 Group arrived. This, the largest formation of British fighters ever assembled, tore into the German bombers, along with five 11 Group squadrons. Miles above the streets of London, the skies

ERNST UDET



Ernst Udet, the second leading German fighter ace in World War I with sixty-two kills, survived to become a national hero. For years after, he made his living as a civilian stunt pilot, and was such a skilled flier that he could actually use his wing tip to pluck a handkerchief from the ground. While visiting the United States in 1933, Udet witnessed a demonstration of Curtiss *Helldiver* biplanes. He purchased two of these obsolete aircraft and arranged to have them shipped to Germany. There he was able to demonstrate their near-pinpoint accuracy as dive bombers, which convinced the German Air Ministry to ask aircraft manufacturers to develop their own versions. After he had joined the Luftwaffe in 1935, Udet chose the version he liked best, the Junkers Ju 87 Stuka, for mass production. Udet also pushed for the development of the DFS 230 glider, which could carry ground troops, and was later a success in the invasion of Belgium. But perhaps his greatest contribution to the Luftwaffe was the development of the single-seat fighter. After flying three different manufacturer's versions, Udet chose the Messerschmitt Bf 109. In 1936 Udet was named chief of the Luftwaffe's Technical Office. Even though he was responsible for several of Germany's most successful aircraft, the fun-loving Udet was ill-suited for the organizational rigors of this position and the politics of the Luftwaffe. After the Battle of Britain, his reputation within the Luftwaffe deteriorated rapidly, and on November 17, 1941, he committed suicide.

were filled with some 350 aircraft, twisting and turning. Again, the bombers scattered their loads around Greater London, failing to damage their intended targets.

When the day was done, and the totals were added up, the Luftwaffe had suffered a great defeat. Although the British people were told that 185 German aircraft had been shot down, the total was actually around 60, including 40 bombers. Additionally, some twenty Bf 109s had ditched in the waters off France, their fuel tanks dry. These losses were enough to convince the Luftwaffe that they had not achieved air superiority



over Fighter Command, which had lost twenty-eight fighters in the day's fighting.

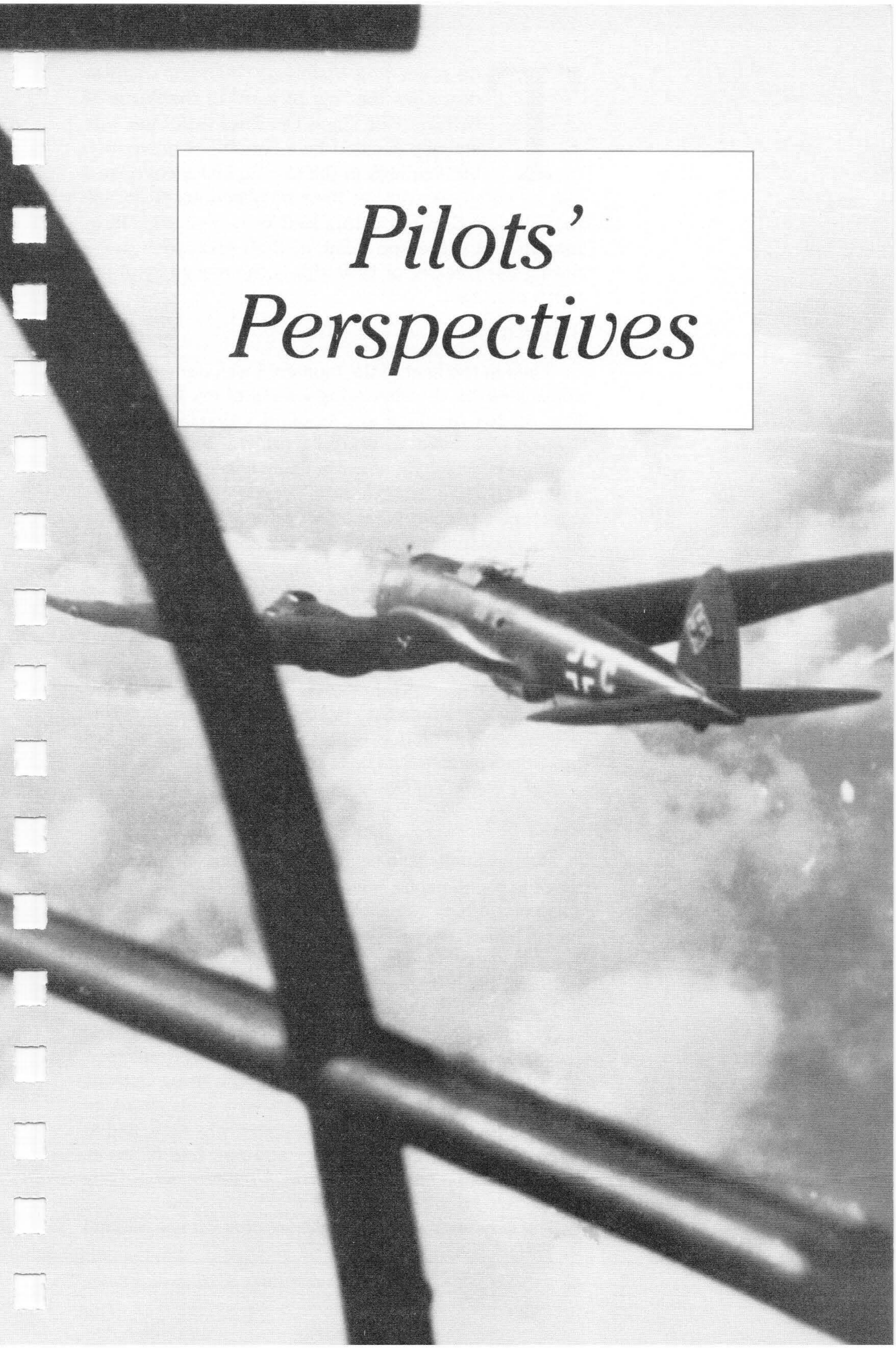
Although Goering still believed that Fighter Command could be wiped out in a couple of days, few agreed with him. On September 16, the weather turned bad, and only a handful of Luftwaffe attacks were made. On September 17, another drizzly day, time had run out for Goering and his Luftwaffe. Hitler cancelled Operation Sea Lion and began making plans for Operation Barbarossa, the invasion of Russia. Although the Luftwaffe would continue to bomb London at night, the imminent threat of invasion was over. Thanks to the efforts of Dowding and Park, and the pilots of Fighter Command, who destroyed 1,389 Luftwaffe aircraft while losing 790 fighters of their own, Britain survived — and won — the Battle of Britain.

"He must have been thinking of our liquor bills."

Unidentified RAF pilot



Pilots' Perspectives



The preceding *Historical Overview* chapter describes the "big picture" of the Battle of Britain. But since the final outcome was actually decided by a handful of brave men battling high in the sky, no historical record can be complete without their recollections. To those British and German pilots and crewmen who flew, fought, and witnessed many of their comrades dying during the summer of 1940, this is the real story of the Battle of Britain.

JULY 11

"Even in the heat of the moment I well remember my amazement at the shattering effects of my fire. Pieces flew off his fuselage and cockpit covering, a great stream of smoke appeared from the engine and a moment later a great sheet of flame licked out from the engine cowling and he dived vertically. The flames enveloped the whole machine and he went straight down, apparently quite slowly, for about 5000 feet, till he was just a shapeless burning mass of wreckage. Absolutely fascinated by the sight, I followed him down and saw him hit the sea with a great burst of white foam. I had often wondered what would be my feelings when killing somebody like this, and especially when seeing them go down in flames. I was rather surprised to reflect afterwards that my own feeling had been one of considerable elation — and a sort of bewildered surprise because it had all been so easy."

RAF Pilot Officer David Crook

JULY 11

"At the English coast I counted some twenty dark spots in the distance, somewhat higher than we were. I was certain they were RAF fighters, but couldn't recognise whether they were Hurricanes or Spitfires — but knew that our twin-engined machines were no match for these single-engined fighters.

However, it was our duty to protect the Stukas, so they could bomb unhindered. The main strength of [our] Me 110 was the two 20mm cannons and four machine guns in its nose. I pressed the firing buttons and bullets flew like water out of a watering can towards the enemy. The closing speed was high, and at the last minute both I and my attacker had to break away to avoid a head-on collision. Whether I scored any hits or not, I don't know.

The next moment, two fighters were on my tail and

Preceding page: The view from the cockpit of an He 111 medium bomber

had opened fire. Almost immediately both of my engines stopped and a return to the Continent was clearly impossible. The enemy saw his success and stopped shooting, but watched me from behind.

I flung off my cabin roof for a quick escape, and hoped it would hit him. I ordered Helmut Scholz to do the same. He radioed that the mechanism to ditch his cabin roof would not operate as a result of bullet damage.

I couldn't bail out and leave Scholz to his fate, and for the same reason, ditching in the sea seemed unwise. The only alternative was a crash-landing on British soil.

After we had landed I found I could not leave the cockpit — a high explosive bullet had hit my seat, causing a big hole. The torn aluminum 'fangs' around the hole had nailed themselves through my parachute pack and tunic and on to my flesh.

I pulled myself forward, and suddenly was free. I left the aircraft and smashed the cabin roof of my gunner so he could get out. He was hurt only by shell splinters. The first thing to do was destroy the aircraft. We didn't have a self-destruct charge, so opened the fuel caps and tried to ignite the petrol with the muzzle flash from my pistol.

I fired eight shots, but had no success. In hindsight, this was just as well, otherwise the aircraft would have exploded and killed us."

Luftwaffe Oberleutnant Gerhard Kadow

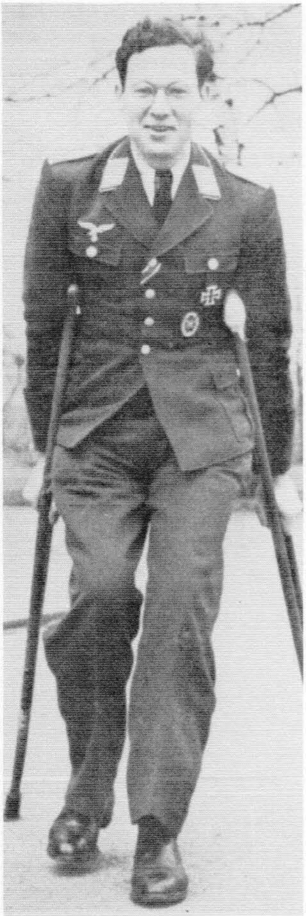
"In those desperate days, if you were twenty-one, you were an old man."

RAF Pilot Officer Dennis David

JULY 19

"A fantastic fireworks. Shots ring to my right and left. Somewhere in my Messerschmitt I feel a strong blow





and hear a heavy rumbling, but the opponent has to go! I see a thin line of smoke under his fuselage, then suddenly the enemy plane is one red ball of fire rushing downward."

Luftwaffe Hauptmann Hannes Trautloft

JULY 27

"North of Dover we met some low-flying Spitfires. I shot [one] down in flames. But now I found myself in the middle of a clump of Englishmen and they were very angry with me. They all rushed at me, and that was my good luck. As they all tried to earn cheap laurels at the expense of one German, they got in each other's way. Well, I managed to outmaneuver them and made them even more confused. Nevertheless, I couldn't avoid being hit. Bullets bespattered my aircraft. The radiator and fuel tank were shot up badly and I had to make a getaway as quickly as possible. Luckily my engine held out to the French coast, then it began to misfire. When I wanted to land the [landing gear] wouldn't work. There was nothing to do but land without it. I made a smooth belly landing."

Luftwaffe Major Werner Molders

AUGUST 8

"The enemy fighters, who were painted silver, were half-rolling and diving and zooming in climbing turns. I fired two five-second bursts at one and saw it dive into the sea. Then I followed another up in a zoom and got him as he stalled."

RAF Squadron Leader J. R. A. Peel

EAGLE DAY, AUGUST 13

"We saw about twenty-four Ju 88s escorted by many Me 110s and 109s. The fighters were stepped up in the sun. We flew alongside the bombers on the left until we were slightly ahead, when the leader gave the order to attack. I started to attack the bombers, but as the escort came down in a dive I made a climbing right turn into the 110s. I saw part of the roof and fuselage of one 110 break away as I fired one burst of about three seconds from almost head on. The enemy aircraft continued in a dive but I didn't see what happened to it."

RAF Pilot Officer Mayers

"There were about twelve Me 109s diving at me from the sun and at least half of them must have been firing deflection shots at me. There was a popping noise and

my control column became useless. I found myself doing a vertical dive, getting faster and faster. I pulled the hood back. I got my head out of the cockpit, and the slipstream tore the rest of me clean out of the machine. My trouser leg and both shoes were torn clean off. I saw my machine crash into the sea a mile off Deal. It took me twenty minutes to come down. I had drifted eleven miles out to sea. One string of my parachute did not come undone, and I was dragged along by my left leg at ten miles an hour, with my head underneath the water. I was almost unconscious when the string came undone. I got my breath back and started swimming."

RAF Pilot Officer Stevenson

AUGUST 15

"I began to close in on [the bomber] and found I was travelling much too fast. I throttled back and slowed up just in time. We were frighteningly close. Then I swung up, took aim, and fired my eight guns. Almost at once, I saw little flashes of light dancing along the fuselage and centre section. I closed in again, when suddenly the bomber reared up in front of me. It was all I could do to avoid crashing into him. I heaved at the controls to prevent a collision, and in doing so I lost sight of him. I dived from 30,000 feet to 3,000 feet at such a speed that the bottom panel of my aircraft cracked, and as my ears

DOUGLAS BADER

After a 1931 plane crash resulted in the amputation of his legs, Douglas Bader was fit with metal legs and tried to resume his career as an RAF fighter pilot. But the RAF was unwilling to keep him on even in a ground job, and forced him to retire. For eight years he repeatedly applied to rejoin the RAF, and was finally reinstated as a fighter pilot when war broke out in 1939. Bader quickly mastered the art of flying a Hurricane, and in June of 1942, he was appointed commander of 12 Group's 242 Squadron.



This squadron of Canadian pilots had previously been lacking in morale, but under Bader, it became a crack flying team, achieving a kills-to-losses ratio of twenty to one, the best in the RAF. Bader developed the big wing theory of fighter combat, and best put it to use on September 15, 1940, when he led five squadrons against Luftwaffe bombers over London and helped rack up the greatest single-day tally of enemy losses in the Battle of Britain. Bader himself became an ace in the summer's fighting, and shot down a total of twenty-two planes from July 1940 to August 1941, when his fighter was cut in half in a collision with a Bf 109 over France. He bailed out, was captured, and spent the remainder of the war in German prison camps.



were not used to such changes in pressure I nearly lost the use of one of the drums. But I had to get that bomber. Then as I came nearer I saw he was on fire. Little flames were flickering around his fuselage and wings. Just as I closed in again he jinked away into a steep climbing turn. When he got to the top of his climb I was almost on him. I took sight very carefully and gave the button a quick squeeze. Once more I saw little dancing lights on his fuselage, but almost instantaneously they were swallowed in a burst of flames. I saw him twist gently earthwards and there was a spurt of fire as he touched the earth. He blew up and set a copse blazing."

Unidentified RAF fighter pilot

"I at once flung my [Bf 109] around and went down after [the Spitfire]. Now I was about 200 yards behind the Tommy. Steady does it — wait. The range was much too far. I crept slowly nearer till I was only a hundred yards away, and the Spit's wings filled my reflector sight. Suddenly the Tommy opened fire and the Me in front of him went into a dive. I too had pressed the firing button after previously aiming carefully. I was only in a gentle turn as I did so. The Spit at once caught fire and with a long grey plume of smoke dived down vertically into the sea."

Luftwaffe Oberleutnant
Hellmuth Ostermann

AUGUST 17

"In the corner of my eye, I saw [a Bf 109] diving for me, pumping shells. A quick turn toward it shook it off, and it slid by below, then reared up in a wide left-hand turn in front of me. It was a fatal move. My Hurricane climbed around easily inside its turn. When I fired, the 109 flicked over and a sudden spurt of white vapor from its belly turned to flame. Down came another. Again a steep turn and I was on its tail. He seemed to know I was there, but he did the wrong thing. He kept on turning. When I fired, bits flew off, the hood came away, and then the pilot bailed out. He look incongruous hanging

there, a wingless body in the midst of this duel of winged machines."

RAF Squadron Leader Peter Townshend

> *"We were all amateurs. Yet the young pilots lived their lives to the full because they knew that any day they'd be dead."*
>
> **RAF Squadron Intelligence Officer Gregory Kirkorian**

AUGUST 18

"Me 109s came at us just as we came out of the clouds. My plane was hit by cannon shells and I went into a spin. I managed to straighten out and finally came safely through a balloon barrage, pulled up and found myself at about 600 feet with a big hole in my right wing and the right side of my cockpit shot away. I was about to bale out when I saw Croydon airfield below. So I decided to crash land, but as I came over the road to the airfield, our anti-aircraft guns opened fire at me. They thought I was a German plane and blew my tail off. Instead of crash landing, I went in head first and ended up in the hospital."

RAF Pilot Officer David Looker

AUGUST 24

"The whole [Bf 109] became enveloped in flames, and pieces began to fly off. Finally, as it went down, more pieces came off, all burning. As it tumbled down toward the Thames Estuary it was really a bunch of blazing fragments instead of a whole aircraft. It was an amazing sight."

RAF Sergeant R. F. Hamlyn



"Ran into a bunch of Huns over [Thames] Estuary. Had a bang at Me 110 but had to break away as tracer was coming over my head from another behind me. He appeared to be hitting his fellow-countryman in front of me but I didn't wait to see if he shot him down. Had a crack at another and shot his engine right out of the wing. Lovely!"

RAF Flying Officer B. J. Lane

AUGUST 31

"Climbing away from Croydon at full boost, I saw ugly black mushrooms of smoke burgeoning to the south. Biggin Hill had bought it again, the Ops room demolished, all the toil and travail brought to nothing. I had flogged my

Hurricane mercilessly during that climb and was then closing in fast on the Me 110s. The squadron was somewhere behind; that was enough. I did not give them a further thought. Only 'get those ill-mannered bastards' who had disturbed our lunch, smashed our airfield, invaded our sky. When they saw us coming, they went into a defensive circle. 'No matter,' I thought, 'keep straight on into the middle of them.' I had pushed my hood back to watch the Me 109s better. Down they came, and a violent cut-and-thrust combat followed, which I vaguely felt must end badly for me. Streams of tracer, turn this way, more tracer, turn that way. Then an Me 109 passed below and turned left, climbing. My favorite shot. Belching black and white smoke, he staggered, slowed up, and rolled over. No time to see more."

RAF Squadron Leader Peter Townshend

SEPTEMBER 7

"There several miles away was a black line in the sky. 35 Hun bombers in close formation — and I gradually began to distinguish about 70 to 100 other little dots — fighters. We went in at the bombers. But before one could take stock of the situation the Messerschmitts were on me. I turned quickly to see if there was anything on my tail and at the same moment two 109s went

ADOLF GALLAND



The second leading German ace during the Battle of Britain, Adolf Galland began his Luftwaffe career during the Spanish Civil War. There he helped develop the tactic of using aircraft to support ground troops, and wrote extensively on the subject. For this he was rewarded with a desk job in Berlin. Desperate to get back to flying, Galland managed to get reassigned to a ground support unit, flying antiquated biplanes. After conspiring with a physician, who wrote in Galland's medical records that he should not fly in open-cockpit aircraft, he was assigned to a Bf 109 squadron in France. On May 12, his first day of action since reassignment, he shot down three Hurricanes. During the Battle of Britain, Galland's victory totals quickly mounted, and he finished the Battle with forty kills to his credit, second to Werner Molders' forty-five. The dashing, mustachioed Galland was so fond of cigars that he had an ashtray installed in his 109, which also sported a cigar-smoking Mickey Mouse painted on its fuselage. Galland was later given command of all Luftwaffe fighter aircraft following the death of Molders, and became a general at age thirty. In 1945, he commanded an elite squadron of Me 262 jet fighters, and survived the war with 103 kills in both prop and jet aircraft.



past my nose. I turned, diving on one and gave him a burst — nothing happened. Presumably I had missed him, but the noise of my eight guns gave me great confidence. I gave the second Me 109 a burst. A sudden flash of brilliant flame, a cloud of smoke, and a vast piece flew off it, and down he went."

RAF Flying Officer George Barclay

"Something told me it was now or never. Two Dorniers were already ablaze in front of me, parachutes drifting downwards. The black mass of bombers flashed towards us as we dived to get in a glancing frontal attack before turning to take them from the rear. My leader opened fire to the left. My turn. I pressed the button. Nothing happened. S—! S—!

It was too late to break off, and the tracer was flying in all directions. Suddenly I noticed the safety catch — it was still on! I wrenched the Hurricane into a tight turn, doubled up over the stick by the crushing centrifugal force. Now I was behind my group, and a Dornier sprang up ahead, growing until it filled my sights. I could see the tail gunner firing at me. At last I pressed the button and the Hurricane shuddered with the eight-gun recoil.

Smoke streamed out of the Dornier's port engine. I let him have another squirt and saw a banner of flame. Just like that, it all seemed easy."

RAF Squadron Leader Jean Zumbach,
former Polish Air Force pilot

SEPTEMBER 9

"After a wide swing eastwards, we headed for London escorted by hundreds of fighters. The targets were

the docks and shipping in the Thames, and could already be seen, when we were suddenly hit by a very short burst of fire from the machine guns of the RAF fighter that had evidently approached from behind, unseen by our rear gunner, Unteroffizer Diebler.

Our [Ju 88] was badly damaged and the situation was grim — the control column didn't work any more, as a bullet must have severed the elevator cables, and both engines were hit, the right losing gasoline, the left oil.

Then the observer, Unteroffizer Rolf, reported that Diebler was lying dead in a pool of blood, a bullet having pierced the artery of his neck. I gave the order to



shed the cockpit roof in order to bail out, but then I found that I could just about control the aeroplane by the trimming wheel, which to some extent replaced the elevator. Thinking of our dead gunner, I decided to stay in the plane and make for the Channel. If our engines kept going long enough, we could get down on the water and maybe get back to France in the rubber dinghy which was carried on board. So I turned south for the shortest route and jettisoned our bombs. However, we now had no guns to defend ourselves against further attack, as these had gone with the roof, so I dived for cover in the clouds 3,000 meters below.

Unfortunately, in the clouds the engines stopped and didn't want to start again. By now we were too low to bail out, so had no choice but to make a very difficult landing with no use of the control column. I couldn't even let out the flaps, because the electrical system had failed!

I was very lucky to make a good landing as another problem was that of all the fields being covered in all sorts of poles and obstacles like old cars — as a defence against a possible landing by assault gliders in an invasion.

However, I got us down in one piece and after we had lifted out the dead gunner, we set fire to our aeroplane and gave ourselves up to police and soldiers."

Luftwaffe Oberleutnant Hans Gollnisch

"Every time I fly, a million people take to their shelters."

Unidentified German navigator

SEPTEMBER 11

"Party over London. Sighted big bunch of Huns south of river and got in lovely head-on attack into leading He 111s. Broke them up and picked up a small batch of six with two Me 110s as escort. Found myself entirely alone with these lads so proceeded to have a bit of sport. Got one of Me 110s on fire whereupon the other left his charge and ran for home. Played with the He 111s for a bit and finally got one in both engines. Never had so much fun before!"

RAF Flying Officer B. J. Lane

SEPTEMBER 15

"Machine-gun fire cracked on every side, and twice there was a hell of a thump quite close behind us. Two British fighters must have collided with two of our Dorniers. The aircraft went spinning down in flames, and below us several parachutes opened. We looked at each other and gave the thumbs-up. This time we had come out of the melee unscathed."

Luftwaffe Do 17 Radio Operator Horst Zander

His Hurricane shot up by a pair of Bf 109s, Pilot Officer John Simpson bailed out and pulled his rip cord. As he dangled from his parachute, one of the 109s started circling him. Since he had parachuted over England, Simpson realized that he was fair game, as he would be able to fly against the Luftwaffe again. The circle became tighter and tighter, until the 109 was so close that Simpson could see the pilot's face. Simpson braced himself for the inevitable hail of bullets, but instead the 109 pilot, in a display of chivalry, waved at him, then sped away toward France.

"I saw a blob coming up from the south, and investigated. Boy! Oh boy! Twenty fat Dorniers, flying wing-tip to wing-tip, ack-ack all round. I was well ahead and above them, so shoved the old throttle open, and dived at them head-on.



I picked the chappie who appeared to be leading the bunch, settled him in my sights, and let him have it.

There isn't much time to muck about in a head-on attack. I gave a short burst, then slid underneath his big black belly with only feet to spare, and flashed through the rest of the formation. I hadn't meant to cut it so close, and instinctively ducked as I saw wings, engines, cockpits and black crosses go streaking past my hood.

I had reached about 450 MPH in my dive, and heaved back on the stick. I blacked out completely as I went up and over in an enormous loop. My sight returned as I lost speed and the centrifugal force lessened. I was on my back, so rolled over. The speed of dive and pull-out had carried me up ahead of them for another attack.

I saw that my first burst had taken effect, the leader had dropped away and to one side, and was turning back. The rest of the formation were wobbling about, and didn't seem to know quite what to do.

As I dived down again, two Hurricanes turned up and joined in the party. The Huns didn't wait for more, but scattered and fled pell-mell, jettisoning their bombs on open country.

I had helped turn twenty bombers away from London! I yelled and whistled with joy, then pounced on the one I had crippled in my first attack. The Hurricanes were 'seeing off' the others OK, so I left them to it.

He appeared to be having difficulty with one engine. I fixed that by stopping it altogether for him. He looked a bit lopsided then, so I stopped the other one too, and he started a long, steep glide down.

I saw the rear gunner bale out, so went up very close and had a look at the aeroplane. It was pretty well riddled. Eight machine guns certainly made a mess!

I had a look at the pilot. He sat bolt upright in his seat, and was either dead or wounded, for he didn't even turn his head to look at me, or watch out for a place to land, but stared straight ahead.

Suddenly, a pair of legs appeared, dangling from the underneath hatch. The other gunner was baling out. He got out as far as his waist, then the legs kicked. They became still for a moment, then wriggled again, they

writhed, thrashed and squirmed. Good God, he's stuck! Poor devil, he couldn't get in or out, and his legs, all I could see of them, flailed wildly as he tried to release himself.

It was my fault. I suddenly felt guilty and almost physically sick, until I thought of all the people down below, wives, young mothers, kiddies, huddled in their shelters, waiting for the all clear.

The legs still wriggled and thrashed, 2,000 feet above the cool green fields, trapped in a doomed aircraft, gliding down, a dead pilot at the controls. First one boot came off, then the other, he had no socks on, his feet were quite bare: it was very pathetic.

He'd better hurry, or it'd be too late.

He hadn't got out before they were down to 1,000 feet. He'd be cut in half when they hit the ground, like cheese on a grater. In spite of all he stood for, he didn't deserve a death like that. I got my sights squarely on where his body would be, and pressed the button. The legs were still. The machine went on. The pilot was dead. He made no attempt to flatten out and land, but went smack into a field, and the aeroplane exploded. I saw pieces sail past me as I flew low overhead. I didn't feel particularly jubilant."

RAF Pilot Officer Boggle Bodie

During the early part of the Battle of Britain, the body of a German pilot washed ashore on the British coast. The pilot's body was buried with full honors in an RAF ceremony, with six RAF pallbearers, and even an RAF wreath on the casket, thus typifying the respect each side had for the other in the early going.

"I had damaged [the Hurricane] badly, and she was on fire. She ought to have been a dead loss. Yet she did not crash but glided down in gentle curves. My flight companions and I attacked her three times — without a final result. I flew close alongside the flying wreck, by now thoroughly riddled, with smoke belching from her. From a distance of a few yards I saw the dead pilot sitting in his shattered cockpit, while his aircraft spiralled slowly to the ground as though piloted by a ghostly hand."

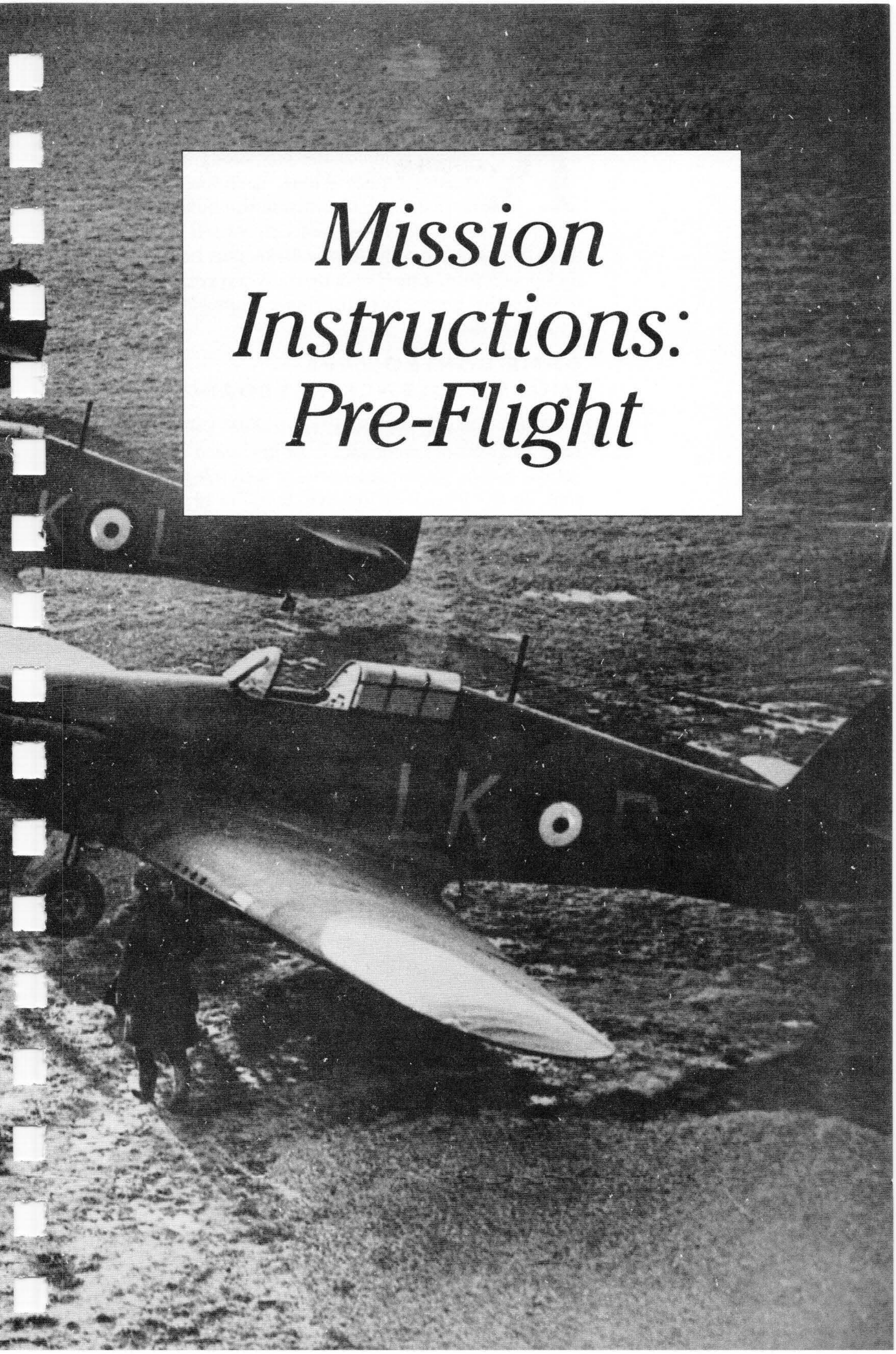
Luftwaffe Major Adolf Galland

"This time, for a change, we outnumbered the Hun, and believe me, no more than eight got home from that party. At one time you could see planes going down on fire all over the place, and the sky seemed full of parachutes. It was sudden death that morning, for our fighters shot them to blazes."

RAF Squadron Leader Douglas Bader



Mission Instructions: Pre-Flight



LOADING INSTRUCTIONS

Remove the floppy disks marked *Their Finest Hour: The Battle of Britain* from the disk envelope inside the box, along with the Frequency Cipher Wheel. Then look at the Reference Card, also inside the box, to find the *Loading Instructions.* These instructions tell you how to start the game from the floppy disks, plus how to install and play it from a hard disk drive. When you've finished loading the game, see the *Game Controllers* section which follows.

GAME CONTROLLERS (MOUSE/JOYSTICK/KEYBOARD)

In this manual, the word "controller" will be used to refer to your mouse, joystick, or keyboard cursor keys (arrow keys). "Controller buttons" will refer to the buttons on the mouse or joystick. If you're playing with a keyboard, there will be corresponding keyboard keys that will serve as controller buttons.

Preceding page: As the "scramble" bell rings, Hurricane pilots race toward their fighters to intercept the Luftwaffe

Below: Loading the machine guns of a Bf 109

To find out which controllers the program supports on your computer, please see your Reference Card.

If your computer doesn't support a mouse or a joystick, the keyboard will control all of the game func-



tions, and the cursor keys used to pilot aircraft and move machine guns around. However, if your computer does support a joystick or mouse, we urge you to use it, as controlling the game is easier than with the cursor keys. The joystick gives the best true-to-life control, particularly for piloting the plane and performing aerial maneuvers. The mouse gives the best fine control, which is important for precision maneuvers such as aiming guns and moving a fighter into a favorable position from which to attack.

> **"On-the-spot repairs of damaged aircraft were carried out by our ground crews, who were magnificent. All night long, lights burned in the shuttered hangars as the fitters, electricians, armourers and riggers worked unceasingly to put the maximum number on the line for the next day's operations. All day too they worked, not even ceasing when the airfield was threatened with attack. A grand body of men about whom too little has been written but without whose efforts victory would not have been possible."**
>
> **RAF Flight Lieutenant Al Deere**

Adjusting Your Joystick

If you are using a joystick when you first start up the game, the program will ask you if you want to use it. Press the **Y** key if you're using a joystick, and the **N** key if you're using a different controller. If you press the **Y** key, the program will walk you through a three-step joystick adjustment process:

1. First, center the joystick and click any joystick button.
2. Next, while holding the joystick in the top left corner, click any joystick button.
3. Finally, while holding the joystick in the lower right corner, click any button.

You can adjust your joystick anytime during the game by pressing **Alt-C.**

Using the Controller to Select from the Menus and Screens

After you've loaded *Their Finest Hour,* you'll need to move through several menus that allow you to select missions, choose aircraft, keep track of Combat Records, and more. You'll also need to select icons on different screens throughout the program. Whenever you're at a menu or screen, you'll see a list of choices, or icons, along with a floating arrow. To make your selection, use your controller to move the arrow over the desired choice or icon, then click your controller button.

Non-Standard Mouse or Joystick Buttons

If you're playing the game with a joystick or mouse that has an unusual button configuration, you may be confused when the game instructions call for pressing the "left" or "right" controller button. Here's an easy

"There were so many descending parachutes and falling planes that as time went on few people left their work to see what was happening."

Unidentified eyewitness, referring to the fighting above Canterbury on September 15, 1940

way to find out which of your buttons is considered left and which is considered right. First, read the following *Main Menu* section, then read the *Training Flights* section. Select a Bf 109 from the list of aircraft shown on the Training Flight screen. You'll soon find yourself in the cockpit of this fighter, where you'll see two numbers, showing the number of ammunition rounds you have in your machine guns and cannon. Pressing one of the buttons on your joystick or mouse will make the top number decrease. This button is the one referred to as the "left" button. The other button will make the bottom number decrease. This button is the "right" button.

MAIN MENU

When you get to the Main Menu, you'll see a box with a list of choices, surrounded by scenes from the Battle of Britain. On the left, Spitfires soar high above the English Channel, barrage balloons, radar installations, and the white cliffs of Dover. On the right, Stukas dive-bomb ships in the Channel while medium bombers roar off toward England.

Use the floating arrow to choose any of these Main Menu selections:

FLY TRAINING FLIGHT This lets you hone your flying, shooting, and bombing skills in a variety of practice situations. The results of these Training Flights will not count on your Combat Record.

FLY COMBAT FLIGHT This lets you fly an actual mission, the results of which will count on your Combat Record.

FLY CUSTOM MISSION This lets you fly in missions that you've created with the Mission Builder (see your Reference Card for more information on using the Mission Builder).

PLAY CAMPAIGN This lets you take part in various campaign missions, where you can change the historical outcome of the Battle of Britain if you're good enough.

REVIEW COMBAT RECORDS This lets you look over the records of the pilots and crews who have flown on your missions.

REVIEW COMBAT FILM This sends you to the Review Combat Film room, where you can watch the combat action you've recorded and saved from your various missions.

EXIT FROM PROGRAM This lets you leave the game and return to your computer's operating system.

TRAINING FLIGHTS

To learn and practice the skills you'll need when flying a combat mission, we encourage you to fly as many Training Flights as you can. Since the results won't count on your Combat Record, you can experiment, take foolish chances, and make lots of mistakes. Training Flights are the best way to develop that "combat edge" you'll need in battle.

When you choose FLY TRAINING FLIGHT from the Main Menu, you'll be presented with an Aircraft Selection menu. There you'll see eight German and British aircraft you can choose from. Move the arrow to either the aircraft silhouette or the name next to it, then click the controller button to make your selection.

Next you'll be shown a Training Flight Selection menu. This has a list of four Training Flights specific to

TRAFFORD LEIGH-MALLORY



The volatile, controversial leader of 12 Group during the Battle of Britain, Trafford Leigh-Mallory graduated with honors in history from Cambridge. He dropped out of law school to become a soldier during World War I, and later served as the commander of an aerial reconnaissance squadron. Between the wars, his brother George died in a failed attempt to climb Mount Everest in 1924. In 1937 Leigh-Mallory was appointed commander of 12 Group, which was responsible for fighter coverage over Central England. Although many expected him to be given command of the more strategically important 11 Group in the spring of 1940, Dowding named Keith Park to that position, and Leigh-Mallory would quarrel with these two men for the next several months. He criticized Dowding and Park for not sending up large numbers of fighters to attack Luftwaffe aircraft, and became a supporter of the big wing theory, which was developed by one of his squadron commanders, Douglas Bader. These big wings took a long time to assemble, and proved to be a failure when 12 Group was called upon to protect 11 Group's northern bases during the Battle of Britain. However, in mid-September, big wings from 12 Group contributed to the large number of enemy aircraft shot down over London. Following the Battle of Britain, Leigh-Mallory replaced Park as the head of 11 Group, and directed offensive fighter raids over France. He took over Dowding's old position as head of RAF Fighter Command in November 1942, and in 1943 was named commander in chief of the Allied Expeditionary Force for the invasion of France, Operation Overlord. Leigh-Mallory developed an aerial assault strategy that helped bring about the success of the D-Day landings on June 6, 1944. He was appointed commander in chief of Southeast Asia in November 1944, but on the way to his new post, he was killed in a plane crash.

"Between leaving in the morning and returning (or not returning) when the day's work was done, there might have been two, three, four sorties."

RAF Squadron Leader Peter Townshend

that type of aircraft you've selected. For example, the training missions you can choose for a fighter include forward gunnery practice, intercepting bombers, and escorting bombers. The first mission on each of the lists is fairly easy, but subsequent ones become increasingly difficult. Once you've selected a Training Flight, you'll be sent to Flight Briefing before you begin your flight.

COMBAT FLIGHTS

With these missions, you'll be reliving historically authentic flights that took place during different phases of the Battle of Britain (see the *Historical Overview* chapter for more information). When you're flying one of these Combat Flights, you'll select from a roster of pilots you've created for the side you're flying on. Their successes and failures will be kept track of in a Combat Record. Medals and promotions will be won by those who are skillful and courageous in battle, but a far less glorious fate awaits those who are not.

To select a Combat Flight, move the arrow to FLY COMBAT FLIGHT on the Main Menu, and press the controller button. Next you'll be at an Aircraft Selection menu, where you'll see eight German or British aircraft silhouettes. Click on either the silhouette of the plane you want to fly or the name next to it. You'll then move to a Flight Selection menu, where you can choose from eight historically-based missions appropriate for the type of aircraft you've selected. These choices are ranked in order of difficulty, with the first choices being relatively easy, and the succeeding choices becoming increasingly difficult. You'll only see the first four mission choices when you come to the menu. To see the next four choices, press FORWARD. If you'd like to see the previous four choices again, press BACK. To make your selection, move the floating arrow to either the mission text or the number on the left side, and press your controller button. To leave the Flight Selection menu altogether, press EXIT. When you have selected a mission, you'll move to Flight Briefing.

CUSTOM MISSIONS

When you pick this selection from the Main Menu, you'll be shown a list of all the missions you've previously created with the Mission Builder (see your Reference Card for more information about building your own missions). If the list is a long one, move the floating arrow to the down arrow icon next to the list, and hold

down your controller button to view all the missions on the list. Move the arrow to the up arrow icon and hold down your controller button to move back up the list. When you've found the mission you want to fly, click the arrow on it to select it. You'll then go to Flight Briefing.

CAMPAIGN MISSIONS

When you play Campaign Missions, you get a chance to change the historical outcome of the Battle of Britain. You can choose to command either the British or the German side, and fly a number of consecutive missions on that side starting from July 10, 1940, the date generally recognized as the commencement of the Battle of Britain. Due to the changing weather conditions at that time of year, you'll only be flying a mission every two or three days. The success or failure of each of your individual missions is magnified, since each outcome reflects upon your entire side during the battle. Also, the effects of one mission are carried over to subsequent missions. For example, if you're playing on the German side, and you bomb certain installations, those installations will remain out of action for a given length of time.

After every mission, a scoring screen will let you know how close your side is to winning or losing the campaign. If you're directing the British side, you'll win the Battle of Britain by surviving until September 16. This was the date by which the Luftwaffe needed to gain air superiority so that Operation Sea Lion, the invasion of England, could be launched. You'll also win by shooting down enough Luftwaffe aircraft to deplete their air strength to the point where they can no longer continue their aerial assault. If you're directing the German side, you'll win by destroying enough Fighter Command aircraft, either in the air or on the ground, so that the Luftwaffe gains air superiority over England and the invasion can take place. No matter which side you choose, final victory may require that you direct from fifteen to twenty-five missions. (For more information about actual British and German campaign strategies you might want to experiment with, see the *Historical Overview* chapter.)

Amazingly, only one RAF fighter pilot received Britain's highest award for valor — the Victoria Cross — during all of World War II. That honor went to Flight Commander James Nicolson, for an encounter that took place during the Battle of Britain. Nicolson's Hurricane was badly shot up off Southampton, and with flames enveloping his cockpit, he tried to bail out of the stricken aircraft. Suddenly, a Bf 110 flew right in front of him, and Nicolson sank back into his seat and began firing at it. The 110 tried to evade the Hurricane, but Nicolson stayed with it. By now, the flames were so intense that flesh was peeling off his left hand as it held the throttle lever. Nevertheless, Nicolson managed to give the 110 one last burst and bring it down. Badly burned, he finally bailed out.

Starting a Campaign

To begin a campaign, choose PLAY CAMPAIGN from the Main Menu. You'll then see another menu, with the following choices:

START NEW CAMPAIGN DIRECTING THE RAF This creates a new British campaign, with the starting date set at July 10, 1940. At the text cursor, type in the name of your campaign, and press **RETURN**. You'll then go to the Campaign Map.

START NEW CAMPAIGN DIRECTING THE LUFTWAFFE This creates a new German campaign, which will also start on July 10, 1940. Type in the name of your campaign, press **RETURN**, and you'll be sent to the Campaign Map.

CONTINUE CAMPAIGN IN PROGRESS Choosing this displays the list of available campaigns that have already been created and saved on disk. If this list is a long one, move the floating arrow over the down arrow icon, and hold the controller button to look down the list. To look back up the list, hold the controller button after you move the floating arrow over the up arrow icon. At the bottom of the list, you'll also see two buttons, labeled RETRY and CANCEL. If you're saving your campaigns on floppy disks, and want the program to search a particular disk for your campaign, insert that disk and press RETRY. If you don't want to direct any of the campaigns listed, and want to direct a new one instead, press CANCEL.

Bombs being loaded on the external bomb mounts of a Ju 88



Once you've selected an available campaign, you'll move to the Campaign Map.

EXIT This sends you back to the Main Menu.

Campaign Map

After you've started a new campaign or chosen an existing one, you'll go to the Campaign Map. At the top of this map is the word "CAMPAIGN," along with the name of your campaign, plus its historical date and time. From this map you'll send your forces into combat on the date shown above. You'll organize your aircraft into flight groups, give them orders, and begin that day's mission by taking the controls of one of the planes.

> **"The Fuhrer has ordered me to crush Britain with my Luftwaffe. By delivering a series of very heavy blows I plan to have this enemy, whose morale is already at its lowest, down on its knees in the near future so that our troops can land on the island without any risk."**
> **Reichsmarschall Hermann Goering, in a speech to his Luftwaffe commanders on August 1, 1940**

This Campaign Map resembles the Flight Briefing Map, with the English Channel, Southern England, and the north coast of France displayed (see the *Flight Briefing* section for comparison). The map will contain different information for each side. If you're playing an RAF campaign, you'll see icons on the map representing all the different British ground installations and ship convoys, with a special highlight on those that are about to be attacked. These targets include airfields, radar sites, and factories. You may also see icons that represent formations of incoming Luftwaffe aircraft. If you're playing a Luftwaffe campaign, you'll see icons representing all the possible targets you can attack, including ground installations and ship convoys. You'll then have to decide which ones to send your aircraft to assault.

To reveal information about the ground installations on your map, move the floating arrow over any installation icon. In the column in the lower right-hand corner of the screen, you'll see the name of the installation, along with its status (whether or not it has been previously damaged or destroyed in the campaign).

For both German and British campaigns, you'll see four buttons at the bottom of the screen:

BRIEFING This gives you a description of the status of your campaign, and tells you how close each side is to victory or defeat.

ROSTER This lets you create and select pilots and crews for that day's mission (see the *Flight Roster* section for more information).

CANCEL This sends you back to the Main Menu.

GO FLIGHT This lets you begin your mission.

Flight Groups

Before you begin a Campaign Mission, you'll need to assign the aircraft under your command to various flight groups. A flight group is a given number of aircraft that fly together as a unit. You determine the number and type of aircraft in each flight group, and then assign it to a specific mission objective by creating a flight plan.

Next to the words "PLANES AVAILABLE" on the screen is a number indicating how many aircraft are available to be placed in your flight groups. Below these words are five buttons which you use to determine the composition of each group:

FLIGHT GROUP Click your controller button to cycle through the flight groups you have on hand, plus those you have yet to create. To create a flight group, you must select a plane type (see below) and allocate at least one plane to that flight group from the pool of available planes.

PLANE TYPE Click your controller button to cycle through the different types of aircraft you can allocate to a particular flight group. Each flight group must be made up of the same type of aircraft. For example, if you're flying an RAF campaign, you cannot have a flight group with both Spitfires and Hurricanes in it. However, you can create one flight group of Spitfires and a second of Hurricanes.

NUMBER OF PLANES This lets you select the number of aircraft for the flight group you're creating. There

HUGO SPERRLE



Like Hermann Goering, Luftflotte 3 Commander Hugo Sperrle was a large man with extravagant tastes. A World War I veteran, Sperrle was the first commander of the Condor Legion, the air unit which fought in Spain during the Spanish Civil War. Upon his return to Germany, Sperrle was named general of aviators, and later was put in charge of Luftflotte 3, which covered Southern Germany. Sperrle's squadrons took part in the conquest of Western Europe, and the territory of Luftflotte 3 was expanded to cover Middle and Western France. He set up headquarters in a Paris palace, and proceeded to live a life of luxury. Sperrle's Luftflotte 3 and Albert Kesselring's Luftflotte 2 fought together in the Battle of Britain, and afterward Sperrle's bombers continued to bombard London for months in night raids. Unlike Kesselring, who went on to greater accomplishments, Sperrle remained in his position as head of Luftflotte 3, and it was rumored it was actually his chief of staff who made his decisions for him.

must be at least one plane in a flight group before that group can fly your mission. Press the left controller button to increase the number, and the right controller button to decrease it.

"Wars may be fought with weapons, but they are won by men."
General George S. Patton

FORMATION Click your controller button to cycle through and set the flight formation for the current flight group you're creating.

ORDERS Click your controller button to cycle through and set the mission orders for your current flight group. If you're directing the RAF, you can choose to have your fighters attack either enemy bombers or fighters. If you're directing the Luftwaffe, your choices vary, depending upon the type of aircraft. German fighters can fly in a bomber escort role, or a free-ranging role. *Jabo* fighter/bombers can either fly bomber escort, drop bombs, or strafe installations.

Flight Plan

After you've created a flight group, you must implement a flight plan for it. To do this you'll plot a course by placing a series of navigation points on the Campaign Map for the group to follow. A flight plan is composed of up to six of these points, including a starting point (BEGIN), four rendezvous points (WAY POINTS 1-4), and an airfield at a home-base point to return to (LAND). For fighter Combat Air Patrol (CAP) missions, the flight group will patrol an area by repeating the flight plan until it runs low on fuel. For fighter escort and bomber missions, the flight group follows the flight plan only once.

To create a flight plan, look below the flight group buttons. There, you'll see a chart which looks like this:

FLIGHT PLAN	ALT	ATK
BEGIN		
WAY POINT 1		
WAY POINT 2		
WAY POINT 3		
WAY POINT 4		
LAND		DELETE

To choose where the flight group will begin its mission from, click on BEGIN. A star will appear to the left of the word. Move the floating arrow to the desired location on the Campaign Map, and click the controller button. A starting point icon will appear on the map. If you change your mind, move the arrow to a new location, and click the button again. RAF flight groups can only begin their missions over England or the English Channel. Luftwaffe flight groups can only begin their missions over Continental Europe or the English Channel.

Now look on the screen for the word "ALT" next to the words "FLIGHT PLAN." This shows the current cruising altitude for this flight group, and is given in thousands of feet. (For example, if the number reads "11," the current cruising altitude is 11,000 feet.) Click the left controller button to increase the altitude at which the flight group begins its mission, and the right controller button to decrease the altitude.

You set the locations of the four Way Points the same way you set the BEGIN location. First, click on Way Point 1, move the arrow to the desired location on the map, and click your controller button. An icon will appear on the map to represent the location of that Way Point. Click on the number below ALT to adjust the altitude for your flight group flying toward Way Point 1. If you wish, repeat this procedure for Way Points 2, 3, and 4. You can plot a course with these different Way Points to confuse or divert the enemy.

If you're directing a Luftwaffe campaign, bomber or fighter/bomber flight groups will automatically bomb a target if it is located where you've placed a Way Point icon. If you don't want to attack this target, look for the word "ATK" (attack) next to ALT. The word YES will appear if an attack will occur. To call off the attack, click on YES and that word will go away.

To assign each flight group to a home-base landing area, click on LAND, move the arrow to the desired airfield on the map, then click the controller button.

After you've created a flight plan, you may want to modify it by removing one or more of the Way Points. To do so, click on the Way Point you'd like to remove, then click the DELETE button, which is located to the right of the LAND button. This will remove that Way Point icon from the map.

Campaign Results

Although it may seem like you're fighting the Battle of Britain with just a handful of aircraft, the success of each of your missions represents the degree of success for your entire side. For example, if you successfully bomb radar installations on a Luftwaffe bombing mission, then the rest of the Luftwaffe will have been equally successful bombing similar targets elsewhere in Southern England.

On the Campaign Results screen at the end of your mission, you'll see a chart outlining how your mission results affected the status of each side. It also shows the total air strength remaining for both sides. The percentage of available RAF pilots, planes, and airfields will

> **"It was clear to us Luftwaffe commanders that, although we might gain a temporary ascendancy in the air, permanent air supremacy was impossible without the occupation of the island, for the simple reason that a considerable number of British air bases, aircraft, and engine factories were out of range of our bombers. For the same reason only a few of their ports were open to attack. The range limitations of our fighter aircraft increased the difficulty."**
> **Generalfeldmarschall Albert Kesselring**



Inside the cockpit of a Luftwaffe medium bomber

fluctuate, as will the number of available Luftwaffe planes and crews. These percentages determine how close each side is to winning or losing the Battle of Britain.

REVIEW COMBAT RECORDS

When you choose REVIEW COMBAT RECORDS from the Main Menu, another menu will appear listing five categories of pilots and crew whose records you can review:

RAF PILOTS
Bf 109 PILOTS
Bf 110 CREWS
Ju 87 STUKA CREWS
BOMBER CREWS

You can also choose EXIT, which will return you to the Main Menu.

Use the floating arrow to make your selection. The next menu you'll see will have two lists. The list on the left will show all the current pilots or crews that exist in that category. If this is a long list, move to the down arrow icon next to the list, and press and hold your controller button to see all of the names on the list. Press and hold your controller button on the up arrow icon to move up the list. The list on the right will show the "Top 10" pilots or crews, with their names, the number of missions flown, and evaluation numbers rating their past combat experience. To look at the record of an individual pilot or crew, move the arrow to their name,

and click the controller button. The next screen you'll see will give you detailed information, including rank, status, number of missions flown, number of air victories, number of bombloads dropped, targets destroyed, and number of planes lost.

Choosing REVIEW COMBAT RECORDS only lets you look at pilots' and crews' records. To create pilots and crews go to the Flight Roster screen, which you access from Flight Briefing (see the *Flight Roster* section for more information).

REVIEW COMBAT FILM

Whenever you're flying a mission, you can record your combat action with the replay camera. Pressing the **C** key turns on the camera, which is located in the cockpit of your aircraft. A number next to the camera indicates the percentage of film you have left. You can turn off your camera by pressing **C** again, by waiting until the film runs out, or by pressing **R,** which sends you to the Review Combat Film screen. You can also get to this screen by selecting REVIEW COMBAT FILM on the Main Menu.

Once you've made your film and pressed **R,** you'll be at a screen with the words "REVIEW COMBAT FILM" in the upper part, along with the name of the plane you were flying in when you made your film. At the bottom of the screen, you'll see a floating cursor which you can move with your controller. You'll position this cursor over the desired red buttons on the bottom of the screen, and press your controller button to activate them.

A Bf 109 that was forced to make a crash landing



The View Window

The playback of your film will be shown in the view window in the center of the screen. To the left and right of the view window, you'll see two numeric lists, one marked YOU, the other marked CAMERA. The YOU list shows flight statistics for the aircraft you were flying, while the CAMERA list shows flight statistics from the camera's vantage point, which you can change with the view mode and vantage point controls (see below). Both of these displays show the aircraft's IAS (Indicated Air Speed), the ALTITUDE, the RATE OF CLIMB (+ or - in feet per minute), the HEADING (in number of degrees), the PITCH (the angle of the nose of the aircraft in degrees above or below the horizon), and the amount of AMMUNITION left.

"The nearness of London to German airfields will lose them the war."

Air Chief Marshal Sir Hugh Dowding, shortly after the fall of Dunkirk

Playback Controls

The playback controls in Review Combat Film are located directly below the view window. These controls are similar to those of a VCR. To start the playback of your film, press PLAY. To stop it at any time, press STOP. To fast-forward it at any time, press FWD. To rewind it, which you'll need to do when the end of the film has been reached, press REW. To leave Review Combat Film altogether, press EXIT. You'll be sent back to your aircraft if you were flying a mission; otherwise, you'll be sent back to the Main Menu.

Button	Function
REW	Rewinds film to start
STOP	Pauses the film
PLAY	Starts the film playback
FWD	Fast-forwards the film
EXIT	Exits you from Review Combat Film screen

View Modes

Below the playback buttons at the bottom are three additional red buttons, which control different view modes. Whenever you have selected any of these modes, the word above the button will be highlighted. In the CHASE view mode, the camera looks forward from directly behind your aircraft. This is the view mode you always start in when you first come to the Review Combat Film screen. The next button, COCKPIT, gives you the view from where the pilot is sitting. The final button, FREE, is a free floating eye-in-the-sky. You can pan this eye-in-the-sky around by pressing **U** (up), **D** (down), **L** (left), or **R** (right). To move the camera

"The waiting was the worst part — we'd sit about playing poker with that tension in the pit of our stomachs — it was almost a relief when we heard the phone ring to scramble us."

RAF Group Captain Peter Matthews

forward in the FREE mode, press and hold the square button in the middle of U, D, L, and R. To move the camera straight up or down, press either the red up arrow or the red down arrow.

Button	Function
CHASE	Displays film from behind aircraft
COCKPIT	Displays film from cockpit of aircraft
FREE	Displays film from free-floating position in the sky
U, D, L, R	Pans camera position up, down, left, or right (FREE mode only)
Red square	Moves camera forward (FREE mode only)
Red up arrow	Moves camera view up (FREE mode only)
Red down arrow	Moves camera position down (FREE mode only)

Switching Vantage Points

The buttons on the far right allow the camera to be switched to many vantage points, including different aircraft and objects. If you press the YOU button, the camera will be positioned on or near your aircraft, depending on your view mode. If you press the AIR button, the camera will be positioned from any object that was in the air when you made your film, except for bombs. These objects can include other aircraft, barrage balloons, and even men in parachutes who have bailed out. Press the AIR button repeatedly to cycle through all the different airborne objects, and change the view mode for additional camera positions. If you press the GRND button, the camera will be positioned from targets on the ground. If any aircraft dropped bombs while you were filming, press BOMB to get a bomb's point of view. You can press YOU, AIR, GRND, or BOMB at anytime during your replay. The name of the object or aircraft that the camera is positioned on will always appear on the display at the top of the screen, next to the words "REVIEW COMBAT FILM."

Button	Function
YOU	Moves vantage point to your aircraft
AIR	Moves vantage point to objects in air
GRND	Moves vantage point to land and sea targets
BOMB	Moves vantage point to any bombs dropped during filming

Saving Replays

If you'd like to save the movie of your combat action, look at the lower left-hand corner of the screen. There, you'll see a nameplate titled CURRENT CLIP, with a display panel below it. Move the cursor to the display panel. Press your controller button, and the arrow will be replaced by a text cursor. Type in a name for your film clip, then press **RETURN**. This will restore the floating arrow. Click on the SAVE button to save your film under the name you just typed in. A directory of your film clips will be created, which you can only access by coming to the Review Combat Film screen from the Main Menu. As you accumulate replays, be sure not to give the same name to more than one film, or else you will erase the older version.

Button	Function
SAVE	Saves current replay clip to disk

Loading Replays

To look at a film clip from any previous missions, press the LOAD button. A directory of the available film clips will then appear in the center of the view window. To look down the list, move the floating arrow over the down arrow next to the list, and press and hold the controller button. To look back up the list, press and hold the controller button over the up arrow. To select one of these film clips, click the floating arrow on the one you'd like to watch.

Button	Function
LOAD	Loads films you have saved (will not function if you are in the middle of a mission)

FLIGHT BRIEFING

After you've selected a Training Flight, Combat Flight, or Custom Mission, you'll go to Flight Briefing. This is where you'll learn about your mission in greater detail, choose the pilots or crew to fly it, and make any last-minute modifications.

When you first enter Flight Briefing, you'll see a map of Southern England and the west coast of France. This Flight Briefing Map is similar to the In-Flight Map/Radio that you can access anytime during your mission. Above the map are the words "FLIGHT BRIEFING MAP." To

One reason British pilot losses were so high in the early stages of the Battle of Britain was because they lacked an adequate sea rescue operation to pluck downed pilots out of the English Channel. The Germans, on the other hand, were far better organized for rescuing their pilots, with numerous rescue seaplanes and E-boats patrolling the waters. In addition, a large number of rescue floats, with food, water, blankets, medical supplies, and a radio, were anchored in the Channel. German pilots also carried a fluorescent green dye, which they released in the water so they could be more easily spotted by rescue craft.

the right will be the title of your mission, plus the name of the current pilot or crew who is assigned to your plane.

On the Flight Briefing Map, you'll find various colored icons scattered around the two countries. These icons symbolize various land installations, such as RAF airfields, industrial targets, radar stations, and Luftwaffe bases. To learn more about these installations, move the floating arrow over any icon on the map. The information will then appear in the column on the right side of the screen. You'll see the name of the installation, a description of it, and its status (whether it is operational, or if it has been damaged or destroyed by any previous action). Other icons will identify the location of aircraft and ship convoys in the battle area you are about to enter, along with the ground targets that are about to be attacked by Luftwaffe bombers.

On the bottom of the screen, you'll also find four buttons labeled:

BRIEFING This brings up a detailed description of your mission, which will appear in place of the Flight Briefing Map.

ROSTER This lets you assign pilots and crew to fly your mission (see the *Flight Roster* section which follows)

CANCEL This aborts your mission and sends you back to the Main Menu, where you can choose a different mission if you wish.

GO FLIGHT This lets you begin your flight.

Modifying Your Mission

Before you begin your mission, you can modify many of the combat conditions of your flight by clicking on the Mission Setting buttons in the lower right-hand corner of the screen. However, once you modify a Combat Flight, Custom Mission, or Campaign Mission, the results will not count in any Combat Record. Whenever you select a mission to fly, the Mission Settings you'll see will reflect the values for that particular mission.

The Mission Settings you can modify are:

SETUP Use this to choose between a STANDARD or RANDOM disposition of forces. When you choose STANDARD, the aircraft on both sides will be in the same location every time you play. When you choose RANDOM, they will positioned differently every time you play.

AMMO Use this to change between STANDARD or UNLIMITED amounts of ammunition. In the STANDARD

Fighter pilots on both sides were so terrified of being trapped in a flaming cockpit that some flew with their cockpit hood open so they could bail out quickly. A few even carried pistols, which they planned to use on themselves if fire ever broke out and they couldn't escape.

mode, you'll carry the same number of gun or cannon rounds that aircraft in the Battle of Britain carried. In the UNLIMITED mode, you'll have an endless supply of ammunition.

DAMAGE Use this to change between STANDARD or UNLIMITED amounts of battle damage your aircraft can sustain. In the STANDARD mode, your aircraft can be damaged and even shot down by enemy gunfire. In the UNLIMITED mode, you can't be damaged, shot down, or crash.

FUEL Use this to change between STANDARD or UNLIMITED fuel capacity. In the STANDARD mode, you'll carry a finite supply of fuel, and use it up at the same rate as aircraft in 1940. In the UNLIMITED mode, you'll never run out of fuel.

ENEMY Use this to select the skill level of the opposing pilots or crew members. These settings range from NOVICE to TOP ACE.

START This lets you choose where to start your mission from. If you choose ON GROUND, you'll begin your mission on the runway of your home airfield, and will have to takeoff and fly to the enemy or the target. If you choose IN AIR, you'll begin your mission in mid-flight, and the enemy or target will be nearby.

RESET This reverts the values for the mission back to the original default settings.

"My constant aim throughout this long battle was to intercept the enemy's main bomber force before *it could reach its objective with the maximum number of fighters available at any given hour of the day."*

Air Vice-Marshal Keith Park

FLIGHT ROSTER

The ROSTER button in Flight Briefing lets you create pilots and crews, and choose the ones who will fly in the mission you've selected. You can fly your mission without selecting ROSTER, but then you'll fly with an unnamed pilot or crew, and the results of your mission won't count on any Combat Records. In addition to activating a pilot or crew for the plane you're about to fly, you can select the pilot or crew for any other plane on your side. At first, you won't have a roster of pilots or crews to choose from. But as you create more and more pilots and crews, and as they gain experience in combat, you'll be able to choose those best qualified to support you in your current mission — and return victorious more often as a result.

When you press the ROSTER button, you'll be sent to the Flight Roster screen. At the top of the screen, you'll see the words "FLIGHT ROSTER," plus a list of aircraft icons. These icons represent the different planes that are flying on your side in the particular mission you've chosen. Next to each aircraft icon will be the name of its

assigned pilot or crew. The aircraft that you yourself are going to fly will be highlighted. The pilot and crew from your previous mission will be automatically reassigned to your aircraft if they survived. For example, let's say your last mission was in a Spitfire with a pilot named "Clive." If you are about to fly another one, you'll see the name "Spitfire" highlighted, along with a Spitfire icon, plus the name "Clive." This way, you won't have to create a new pilot every time you fly a new mission.



Creating and Managing Pilots and Crews

In the middle of the Flight Roster screen you'll see six buttons. The first five buttons are various pilot and crew categories for the different RAF and Luftwaffe aircraft. When you press one of these buttons, the roster of available pilots for that type of aircraft will appear at the bottom of the screen. A sixth button lets you create new pilots and crews to add to the roster of whichever type of aircraft you choose.

The five pilot and crew category buttons are:

RAF Use this to list the available Spitfire and Hurricane pilots.

Bf 109 Use this to list the available Bf 109 pilots.

Bf 110 Use this to list the available Bf 110 pilots.

STUKA Use this to list the available Stuka crews.

BOMBERS Use this to list the available He 111, Do 17z-2, and Ju 88 crews.

The last button on the list is **CREATE PILOTS/ CREW.** Use this to create pilots and crew, and to add them to the roster of each category. To do so, first select one of the pilot or crew categories by clicking on the appropriate button. Then, click on the CREATE PILOTS/CREW button. A text cursor will appear. Use your keyboard to type in the name of the pilot or crew, then press **RETURN**. The name of the new pilot or crew will now be added to the roster of available pilots and crews for that aircraft.

Here's an example. Let's say you want to create a new crew for a Ju 88. Click on the BOMBERS button, then click on the CREATE PILOTS/CREW button. Type in the crew name, which we'll call "Blitzers," with the keyboard, then press **RETURN.** You now have a Ju 88 pilot and crew named "Blitzers."

Looking Over the Roster

If you've got a long list of pilots and crew on any roster, move the floating arrow to the down arrow icon on the left side of the screen, and press and hold the controller button to scroll down through all the names. Press and hold the up arrow icon to move back up through the names. To the right of each pilot or crew name, you'll see their rank, the number of missions they've flown, and an evaluation number, which rates them based on their past successes and failures.

Assigning Pilots and Crews

To assign a pilot or crew to a particular plane, first select the category of aircraft you want them to fly. Then, use your arrow to select their name from the roster of available pilots or crews at the bottom of the screen. Finally, click on the aircraft icon at the top of the screen that you want to assign that pilot or crew to fly. The pilot's or crew's name will now appear next to that aircraft icon. Be sure to match the pilot or crew with a plane from the category of aircraft they're qualified to fly. For example, an He 111 crew is qualified to fly the three kinds of German medium bombers, but they cannot fly any other Luftwaffe aircraft.

To deactivate a pilot or crew, click on their name when it appears next to any aircraft icon.

Using the Roster for More Successful Missions

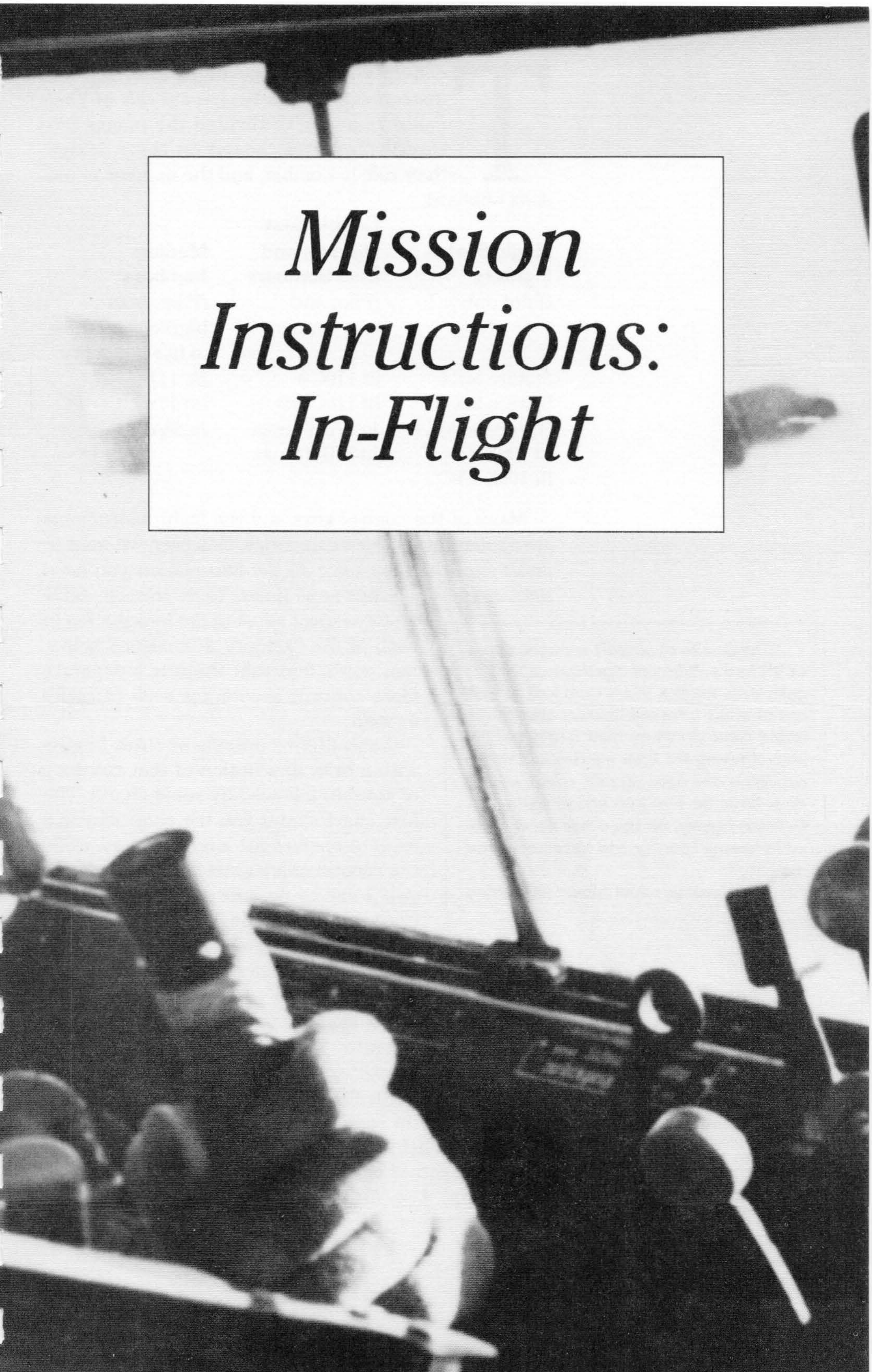
Whenever you complete a mission, the Combat Records for all pilots and crews involved will be updated. The more experience each pilot or crew member gains, the better they'll perform in future missions. When you select these proven, experienced pilots or crews for your missions, they'll generally repeat their successes for you. For example, if you have a Bf 109 pilot on your roster named "Heinz" who has flown many missions and is a crack shot, you might want to assign him as your wingman if you're flying a fighter intercept mission. Chances are he'll distinguish himself in that role, and help you accomplish the goals of your mission. However, as in real-life combat, there's always the possibility that he'll be shot down.

> **"When parachutists come down near homes, they will not be feeling very brave. They will not know where they are or where their companions are. Do not give any German anything. Do not tell him anything. Hide your food, your bicycles, your maps."**
>
> **From a British Ministry of Information pamphlet**

To exit the Flight Roster and return to the Flight Briefing Map, press the EXIT button.



Mission Instructions: In-Flight



To help you learn the flight controls and instruments of the twelve aircraft in *Their Finest Hour*, we've divided the planes into three categories, based on their design, their role in combat, and the number of persons onboard.

Single-Seat Fighters	**Double-Seat Fighters and Dive Bombers**	**Medium Bombers**
(Pilot only)	(Pilot and rear gunner)	(Pilot, bombardier, and three to five gunners)
Spitfire MK I	Bf 110C-4	He 111
Spitfire MK II	Bf 110C-4/B	Do 17z-2
Hurricane MK I	Ju 87B-1 Stuka	Ju 88A-1
Bf 109E-3	Ju 87B-2 Stuka	
Bf 109E-4/B		

Many of the control keys and the flight instruments are similar for all three categories. However, we want to make sure that you have all the information you need right at your fingertips at all times. To do this, we deliberately repeat some of the information in each of the category discussions below, and you'll find that there is a separate flight controls section for each category as well.

"The scores of aircraft brought down or hit had a different significance for each side. English pilots who had to bail out or make a forced landing over the island came down on their native soil and, allowing for their injuries and the provision of a new aircraft, could, sooner or later, be sent into action again. A German fighter, on the other hand, landed in enemy country and became a total casualty."
Generalfeldmarschall Albert Kesselring

Each flight controls section begins with a brief description of that category of aircraft, followed by some charts. The first chart shows you the controls you'll need to operate the aircraft's guns, while the second chart gives you a list of keys you'll use to fly and maneuver the aircraft itself. Another chart shows you how to look around outside your aircraft. If you're flying a medium bomber, there's also a discussion on how to move to the different gunner positions and man the guns, as well as how to move to the bombardier's position and drop bombs. Finally, a section on cockpit instruments describes all the different gauges and levers you'll see in the cockpit of your aircraft. One cockpit screen in each of the three plane categories is displayed, to help you master the instruments. To see a cockpit screen of every aircraft, along with additional information, see the *German and British Aircraft and Weapons* chapter.

Preceding page: His face showing the strain of the weeks of fighting, an He 111 pilot guides his bomber toward England

Opposite page: A Bf 109 pilot poses with the *staffel* mascot



FLIGHT CONTROLS

Your controller operates just like the control stick on a real plane. For more information, see the *Flight Fundamentals and Tactics* chapter.

Controller Direction	Function
↑ Forward (away from you)	Moves the nose of the plane down
↓ Backward (toward you)	Moves the nose of the plane up
→ Right	Banks the plane to the right
← Left	Banks the plane to the left

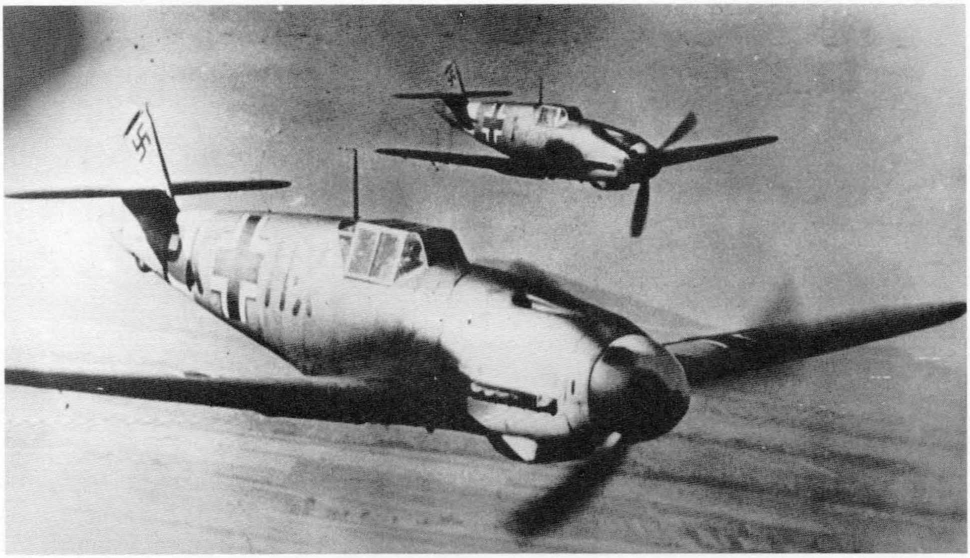
GAME CONTROLS

The following game controls can be used anytime during a mission, regardless of whether you're flying a fighter, dive bomber, or medium bomber:

Keys	Function
Alt P	Pauses game; press any key to continue
Alt S	Turns all game sounds off and on
Alt E	Turns engine sound off and on
Alt V	Gives version number of game
Alt C	Lets you adjust joystick
Alt G	Changes amount of ground detail to speed up game if it is running sluggishly
Esc	Exits the game; returns you to your computer's operating system

SINGLE-SEAT FIGHTER CONTROLS (SPITFIRE, HURRICANE, BF 109)

As a single-seat fighter pilot, you're basically a "flying gun," armed with forward-firing machine guns and, if you're flying a Bf 109, a formidable 20 mm cannon. Your fighter is faster and more maneuverable than a bomber, but it is also less durable, and won't be able to sustain as much battle damage. Each of the fighters you can choose from has its own individual strengths and weaknesses, but they all excel at one task: bringing down enemy aircraft.



A terrifying sight for an RAF fighter pilot to see in his rear view mirror — a pair of Bf 109s

Single-Seat Fighter Weapons Controls

Controller Button	Function
Left controller button or **SPACE BAR**	Fires forward machine guns
Right controller button or period (.) key	Fires 20 mm cannon (Bf 109 only)
Left AND right controller buttons or **RETURN**	Drops bombload (Bf 109 *Jabo* fighter/bomber only)

Single-Seat Fighter Cockpit Controls

Key	Function
+	Increases throttle (shift key not needed)
-	Decreases throttle
L	Lowers and raises landing gear
F	Lowers and raises flaps
C	Turns replay camera on and off
R	Sends you to Review Combat Film (see the *Mission Instructions: Pre-Flight* chapter)
M	Sends you to the In-Flight Map/Radio
J	Lets you jump from your fighter and parachute to safety
Q	Ends mission; sends you to a post-flight evaluation

Single-Seat Fighter View Controls

To look around your fighter in all directions, you can use either the number keys on the top of your keyboard or, if your keyboard has a keypad, use the keypad controls. On some computers, the keypad controls are labeled with arrows, and we recommend that you use them. For a further discussion of these controls, see cockpit instrument #10 in the *Single-Seat Fighter Cockpit Instruments* section below.

Key	Function
8 **(Up Arrow)**	Forward view (your mission starts in this direction)
6 **(Right arrow)**	View right
4 **(Left arrow)**	View left
2 **(Down arrow)**	Rearview mirror (to look behind you)
3 **(PgDn)**	View straight down (regardless of your flight angle)
9 **(PgUp)**	Scan view (look completely around your fighter)

Single-Seat Fighter Cockpit Instruments

When you're inside the cockpit of your chosen fighter, these are the instruments you'll see in front of you:

1. Radio This receiver has two important components. The three-digit number shows what frequency your radio is tuned to, while the light next to it will be lit when you've tuned into the correct frequency, which allows you to receive important mission information. To tune or use your radio, press **M,** which moves you to the In-Flight Map/Radio.

2. Bomb Release Light (Bf 109E-4/B *Jabo* fighter/bombers only) This will be lit if you have a bomb to drop. The number next to the light indicates if you have one or zero bombs left.

3. Flaps Lever This gives you the position of your fighter's flaps. If it is in the up position, the flaps are up; if it is in the down position, the flaps are down. During normal flight your flaps should be up, but for takeoffs and landings, they should be down to increase lift and lower the stalling speed.

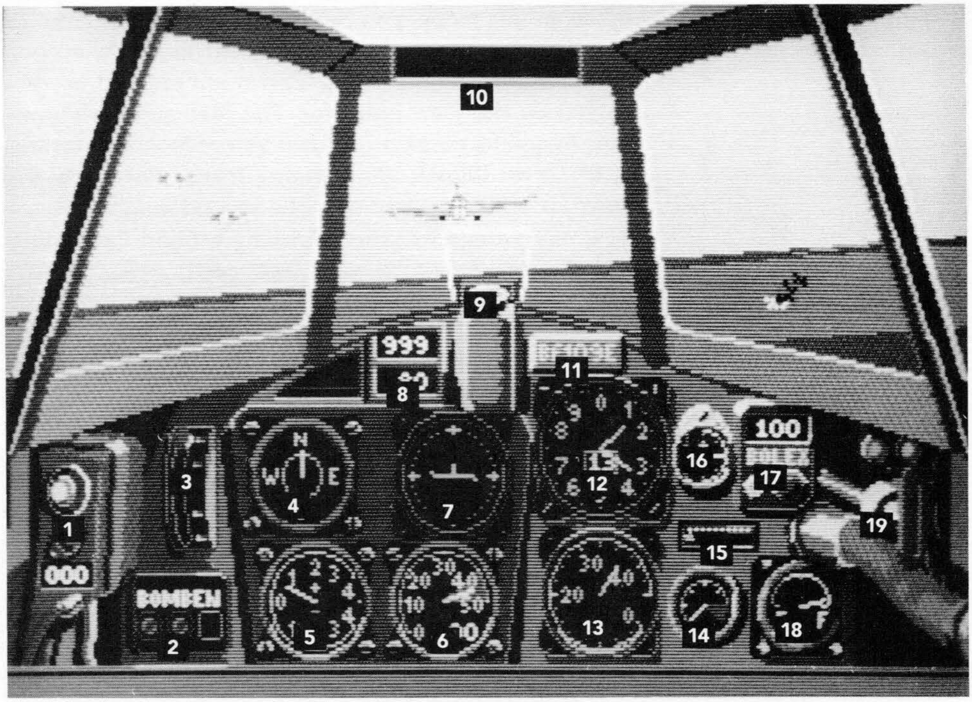
4. Compass This shows which direction your fighter is headed: north, south, east, or west.

5. Climb/Dive Indicator This gauge gives you the rate your fighter is climbing or diving, in thousands of feet per minute. The **+** area of the gauge indicates a climb, while the **-** indicates a descent.

6. RPM Indicator This gives you two readings. The dial shows the number of revolutions per minute (RPMs) your engine is delivering, in units of one hundred. The higher the RPMs, the farther to the right the dial will move. If the throttle setting is at "75" or higher, or if the dial moves into the red area, you'll be using up fuel at a higher rate. The white number at the bottom of the gauge shows the throttle or power setting of the engine. For example, if it reads "85," your engine is set for 85 percent of the power it can produce.

7. Banking Indicator This shows the roll of your fighter (see the *Flight Fundamentals and Tactics* chapter for more information). The large horizontal bar shows the position of your wings relative to the ground, while the small vertical bar shows the direction your tail is point-

Flying over Maidstone, Wing Commander Tom Gleave ran into a large formation of Bf 109s. Heading straight for the German fighters, he shattered one 109 with a four-second gun burst. Turning in tandem with a second 109, Gleave fired again, and the Messerschmitt plunged toward the ground, smoke pouring from its wings. After nearly colliding with a third 109, Gleave fired on it for three seconds, and saw its pilot slump forward as the plane plummeted. A fourth 109 flew above his fighter, and Gleave used the last of his ammunition to give its underside a three-second gun burst, which mortally wounded the German aircraft. Incredibly, Gleave had accomplished this unmatched feat of downing the four German fighters in a Hurricane, an aircraft not renowned for its success in dogfights with 109s.



Cockpit of Bf 109E-4. For other single-seat fighter cockpits, see the *German and British Aircraft and Weapons* chapter.

ing. As you bank your fighter left or right, the horizontal bar will also bank to reflect your position.

8. Ammunition Round Indicator This show how many gun rounds you have left in your forward-firing machine guns. If you're flying a Bf 109, you'll see two numbers. The top one indicates the number of machine gun rounds left, while the bottom number shows how many rounds you have left in your more powerful 20 mm cannon.

9. Gunsight Use this to aim your forward-firing machine guns and cannon at enemy aircraft.

10. View Indicator This panel shows which direction you're looking out of from your fighter. In normal flight, the panel will be blank. When you press the **4** key, the view out of your cockpit window will be the left view, and the word "LEFT" will be displayed on the view indicator. If your computer has enough memory, the cockpit screen will be replaced by a picture of the view looking over the left wing of your aircraft. Pressing the **6** key gives you the right view in the cockpit window with the word "RIGHT" displayed, or the view looking over the right wing of your fighter. Pressing the **3** key gives you the view straight down, and the word "DOWN" will be displayed.

When you press the **9** key, you'll be in the scan

mode. In this mode, you can look around your fighter in any direction by moving your controller, while your fighter remains on course. Two numbers will be displayed on the view indicator. The first number shows how many degrees up or down you're looking, starting at 0° (level flight), and ranging from - 90° (straight down) to + 90° (straight up). The second number shows how many degrees you're looking around, beginning with 0° (straight ahead, your flight path). If you're looking toward the right, the number ranges from 0° to + 90° (directly right) to + 180° (behind you). If you're looking left, the number ranges from 0° to - 90° (directly left) to - 179° (just about straight behind you).

11. Nameplate This gives the name and model number of your fighter.

12. Altimeter This gives your distance above sea level in feet. The digital number indicates thousands of feet, the big hand on the dial indicates hundreds of feet, and the little hand tens of feet. For example, if the digital display reads "21," the big hand is on the "4," and the little hand on the "8," your altitude is 21,480 feet.

13. Airspeed Indicator This shows how fast your



Spitfire pilots relax between sorties with a game of cards
Courtesy of John Down

fighter is flying, in tens of miles per hour. For example, if the hand on the gauge is pointing to "30," you're flying at 300 miles per hour.

14. Engine Damage Indicator This dial shows the amount of damage done to your fighter's engine in combat. If the indicator moves into the red area, the power output of the engine will be severely reduced and your RPM indicator reading will drop. You may then have to abort the mission and return to your home base, or even bail out.

15. Airframe Damage Indicator This gauge shows the amount of structural damage sustained by your fighter in combat. When the indicator is in the red zone, your aircraft is severely damaged and may go out of control, forcing you to bail out.

16. Pitch Indicator This shows the position of the nose of your fighter relative to the horizon. **+** means your nose is pointing above the horizon, **0** is level with the horizon, and **-** indicates that your nose is pointing below the horizon.

17. Replay Camera Indicator This shows the percentage of film you have remaining in your replay camera when you are recording. The number on the indicator will decrease until you're out of film. When you press **C** to turn on your replay camera, a light above the indicator will go on, and stay on until you have turned your camera off, or used up all the film.

18. Fuel Gauge This shows how much fuel remains in your fighter's fuel tanks: **E** means empty, **F** means full.

19. Landing Gear Lever This shows the status of your landing gear. If the lever is forward or up, your landing gear is up; if the lever is back or down, your landing gear is down. Don't forget to lower your landing gear for a landing, or to raise it after takeoff. Lowering your landing gear has the effect of slowing your airspeed, which may be useful in certain situations.

"We might, had the plans been ready, have crossed to England with strong forces after the Dunkirk operation."

Generaloberst Guenther Blumentritt

DOUBLE-SEAT FIGHTER AND DIVE BOMBER CONTROLS (BF 110, JU 87 STUKA)

When you're flying a double-seat fighter or dive bomber, you're in a larger, less maneuverable aircraft than a single-seat fighter. However, you're more heavily-armed, with a rear-firing machine gun to help ward off enemy attacks. Like a single-seat fighter, you're also armed with forward-firing machine guns, and, if you're flying a Bf 110, a 20 mm cannon. Your plane is slightly more durable than a fighter, so it will take more enemy bullets to bring it down. The Stuka and the fighter/ bomber version of the Bf 110 carry bombs, and in the hands of a skilled pilot, they can be extremely accurate for low-altitude bombing (Bf 110C-4/B) and dive-bombing (Ju 87).

Double-Seat Fighter and Dive Bomber Weapons Controls

Your forward-firing guns function exactly the same as in a single-seat fighter. But your plane is equipped with an extra weapon at your defense — a rear gunner. To activate your rear gunner, and switch to the rear view, press the **G** key (the **2** key will also switch you to this mode). Your plane will fly on, with the controls left where you set them. If you press **A** before you switch to the rear gunner, you'll activate the automatic pilot. Then, to manually aim the machine gun, move your controller around. If you press **A** while you're manning the rear gun, you'll activate the automatic shooting mode, which aims and fires the machine gun for you. You cannot aim and fire the rear machine gun yourself while it is in this mode. If you want your rear gun to be firing away while you return to piloting the plane, you must activate this auto-shoot mode first.



A Bf 110 *Zerstorer* and its pilot. The barrels of two of the 7.92 mm machine guns can be seen protruding from the nose, while the two openings underneath the nose are for the two 20 mm cannons.

Controller Button	Function
Left controller button or **SPACE BAR**	Fires forward machine gun or rear machine gun
Right controller button or period (.) key	Fires 20 mm cannon (Bf 110 only)
Left AND right controller buttons or **RETURN**	Drops bombload (except Bf 110C-4)

Double-Seat Fighter and Dive Bomber Cockpit Controls

Key	Function
+	Increases throttle (shift key not needed)
-	Decreases throttle
L	Lowers and raises landing gear
F	Lowers and raises flaps
D	Extends and retracts dive brakes
C	Turns replay camera on and off
R	Sends you to Review Combat Film (see the *Pre-Flight* chapter)
P	Moves you to pilot's position
G	Moves you to rear gunner seat
A	Turns on the automatic pilot, or automatic shoot mode if you're manning the rear gun position at the time
S	Lets you toggle between bombload settings
M	Sends you to the In-Flight Map/Radio
J	Lets you and crew member jump from plane & parachute to safety
Q	Ends mission; sends you to post-flight evaluation

Double-Seat Fighter and Dive Bomber View Controls

To look around your double-seat fighter or dive bomber in all directions, you can use either the number keys on the top of your keyboard or, if your keyboard has a keypad, use the keypad controls. On some computers, the keypad controls are labeled with arrows, and we recommend that you use them. For a further discussion of these controls, see cockpit instrument #13 in the *Double-Seat Fighter or Dive Bomber Cockpit Instruments* section below.

Key	Function
8 **(Up arrow)**	Forward view (your mission starts in this direction)
6 **(Right arrow)**	View right
4 **(Left arrow)**	View left
2 **(Down arrow)**	Switch to rear gunner
3 **(PgDn)**	View straight down (regardless of your flight angle)
9 **(PgUp)**	Scan view (look completely around your fighter or dive bomber)

Double-Seat Fighter and Dive Bomber Cockpit Instruments

Once you're seated at the controls of a double-seat fighter or dive bomber, these are the instruments you'll be relying on in combat:

1. Landing Gear Lever (Bf 110 only) This shows the status of your landing gear. If the lever is forward or up, your landing gear is up; if the lever is back or down, your landing gear is down. Don't forget to lower your landing gear for a landing, or to raise it after takeoff. Lowering your landing gear has the effect of slowing your airspeed, which may be useful in certain situations.

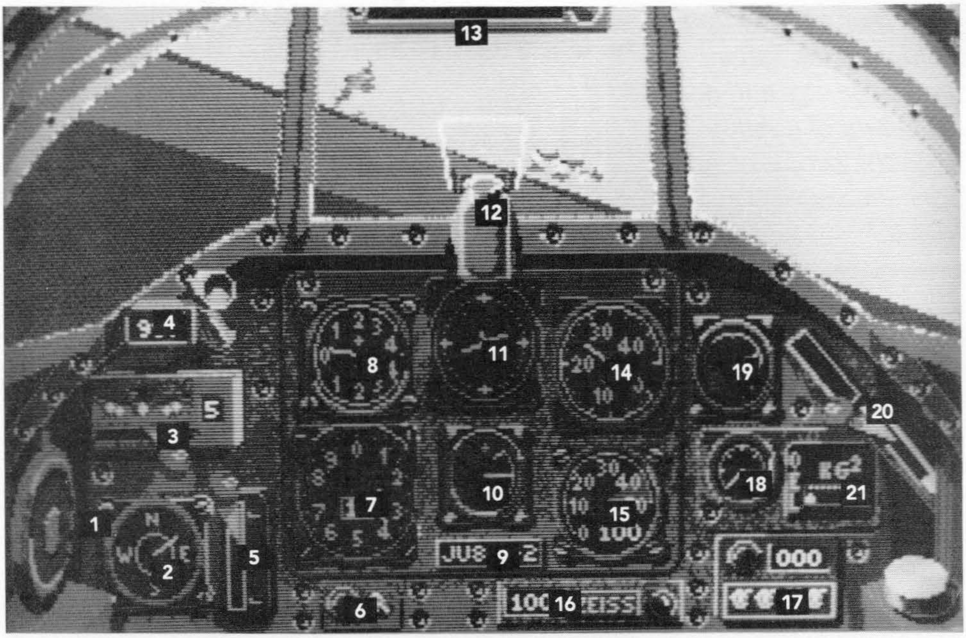
2. Compass This shows which direction your double-seat fighter or dive bomber is headed: north, south, east, or west.

3. Bomb Indicator Panel (except Bf 110C-4) The number on this panel shows you how many of your externally-mounted bombs you have left to drop. The lever lets you choose how to drop your bombload.

If you're flying a Ju 87 Stuka, you'll be carrying four small wing-mounted bombs and one large fuselage-mounted bomb. When you start your mission, the lever is in the far left position, and a light underneath the miniature aircraft on the panel indicates that only your fuselage-mounted bomb will be dropped when you press **RETURN**. Pressing **S** once moves the lever to the middle, and the lights on the miniature aircraft now indicate that only your four wing-mounted bombs will be dropped. Pressing **S** again moves the lever to the far right, with the lights showing that all of your bombs will be dropped. Pressing **S** a third time returns the lever to the original position.

If you're flying a Bf 110C-4/B, you'll be carrying two fuselage-mounted bombs. Your bomb indicator panel will be in the lower right-hand corner of the cockpit. Underneath the word *BOMBEN* on the panel, you'll see two lights. When the light on the left is lit, one bomb will drop every time you press **RETURN**. When the light on the right is lit, both of your bombs will drop at once if you press **RETURN**. Pressing **S** allows you to toggle between these two settings.

4. Ammunition Round Indicator This show how many gun rounds you have left in your forward-firing machine guns. If you're flying a Bf 110, you'll see two numbers. The top one indicates the number of machine gun rounds left, while the bottom number shows how



Cockpit of a Ju 87B-1 Stuka. Location of Bf 110 landing gear lever shown as #1 above. For a Bf110 cockpit, see page 130.

many rounds you have left in your more powerful 20 mm cannon.

5. Dive Brakes Lever (Ju 87 Stuka only) This shows whether your dive brakes are up or down. Lowering the dive brakes is necessary to slow down a Ju 87 during a dive-bombing run.

6. Automatic Pilot Light This tells you if you've turned on your automatic pilot, which you activate by pressing the **A** key. You'll want to turn on the automatic pilot before moving to the rear gunner position, otherwise the double-seat fighter or dive bomber will fly with the controls set where you left them.

7. Altimeter This gives your distance above sea level in feet. The digital number indicates thousands of feet, the big hand on the dial indicates hundreds of feet, and the little hand tens of feet. For example, if the digital display reads "13," the big hand is on the "7," and the little hand on the "2," your altitude is 13,720 feet.

8. Climb/Dive Indicator This gauge gives you the rate your double-seat fighter or dive bomber is climbing or diving, in thousands of feet per minute. The **+** area of the gauge indicates a climb, while the - area indicates a descent.

9. Nameplate This gives the name and model number of your double-seat fighter or dive bomber.

10. Pitch Indicator This shows the position of the nose of your double-seat fighter or dive bomber relative

"War alone brings up to its highest tension all human energy and puts the stamp of nobility upon the peoples who have the courage to face it."

Benito Mussolini

to the horizon. + means your nose is pointing above the horizon, **0** is level with the horizon, and - indicates that your nose is pointing below the horizon.

11. Banking Indicator This shows the roll of your double-seat fighter or dive bomber (see the *Flight Fundamentals and Tactics* chapter for more information). The large horizontal bar shows the position of your wings relative to the ground, while the small vertical bar shows the direction your tail is pointing. As you bank your plane left or right, the horizontal line will also bank to reflect your position.

12. Gunsight Use this to aim your forward-firing machine guns and cannon at enemy aircraft.

13. View Indicator This panel shows which direction you're looking out of from your double-seat fighter or dive bomber. In normal flight, the panel will be blank. When you press the **4** key, the view out of your cockpit window will be the left view, and the word "LEFT" will be displayed on the view indicator. If your computer has enough memory, the cockpit screen will be replaced by a picture of the view looking over the left wing of your aircraft. Pressing the **6** key gives you the right view from the cockpit window with the word "RIGHT" displayed, or the view looking over the right wing of your double-seat fighter or dive bomber. Pressing the **3** key gives you the view straight down, and the word "DOWN" will be displayed.

When you press the **9** key, you'll be in the scan mode. In this mode, you can look around your double-seat fighter or dive bomber in any direction by moving your controller, while your plane remains on course. Two numbers will be displayed on the view indicator. The first number shows how many degrees up or down you're looking, starting at 0° (level flight), and ranging from - 90° (straight down) to + 90° (straight up). The second number shows how many degrees you're looking around, beginning with 0° (straight ahead, your flight path). If you're looking toward the right, the number ranges from 0° to + 90° (directly right) to + 180° (behind you). If you're looking left, the number ranges from 0° to - 90° (directly left) to - 179° (just about straight behind you).

14. Airspeed Indicator This shows how fast your double-seat fighter or dive bomber is flying, in tens of miles per hour. For example, if the hand on the gauge is pointing to halfway between "20" and "30," you're flying at 250 miles per hour.

15. RPM Indicator (One gauge for each engine — two

on the Bf 110, one on the Ju 87 Stuka) Each indicator gives you two readings. The dial shows the number of revolutions per minute (RPMs) the engine is delivering, in units of one hundred. The higher the RPMs, the farther to the right the dial will move. If the throttle setting is at "75" or higher, or if the dial moves into the red area, you'll be using up fuel at a higher rate. The white number at the bottom of the gauge shows the throttle or power setting of the engine. For example, if it reads "85," your engine is set for 85 percent of the power it can produce.

16. Replay Camera Indicator This shows the percentage of film you have remaining in your replay camera when you are recording. The number on the indicator will decrease until you're out of film. When you press **C** to turn on your replay camera, a light above the indicator will go on, and stay on until you have turned your camera off, or have used up all the film.

17. Radio This receiver has two important components. The three-digit number shows what frequency your radio is tuned to, while the light next to it will be lit when you've tuned into the correct frequency, which allows you to receive important mission information. To tune or use your radio, press **M,** which moves you to the In-Flight Map/Radio.

18. Engine Damage Indicator (One gauge per engine — two on the Bf 110, one on the Ju 87 Stuka) Each dial shows the amount of damage done to your double-seat fighter's or dive bomber's engine in combat. If the indicator moves into the red area, the power output of the engine will be severely reduced and your RPM indicator reading will drop. You may then have to abort the mission and return to your home base, or even bail out.

19. Fuel Gauge This shows how much fuel remains in your double-seat fighter's or dive bomber's fuel tanks: **E** means empty, **F** means full.

20. Flaps Lever This gives you the position of your double-seat fighter's or dive bomber's flaps. If it is in the up position, the flaps are up; if it is in the down position, the flaps are down. During normal flight your flaps should be up, but for takeoffs and landings, they should be down to increase lift and lower the stalling speed.

21. Airframe Damage Indicator This gauge shows the amount of structural damage sustained by your double-seat fighter or dive bomber in combat. When the indicator is in the red zone, your aircraft is severely damaged and may go out of control, forcing you to bail out.

"The Fuhrer and Supreme Commander has decided that a landing in England is possible, provided that air superiority can be attained and certain other necessary conditions fulfilled. The date of commencement is still undecided. All preparations to be begun immediately."

Top-secret directive issued by the German Armed Forces, July 2, 1940

MEDIUM BOMBER CONTROLS (HE 111, DO 17Z-2, AND JU 88)

As the pilot of a medium bomber, you're flying a stable platform from which a large bombload can be dropped on enemy installations, usually from medium altitudes. However, your bomber is much slower and less maneuverable than the enemy fighters which will be defending these installations or intercepting you on your bombing mission. To partially compensate for this, your bomber is armed with machine guns, located at various positions throughout the fuselage (see the *German and British Aircraft and Weapons* chapter to find out where the machine guns are located on each bomber). The He 111 and the Do 17z both have five machine gun positions, while the Ju 88 has three. Your medium bomber is also very durable, and it can generally take a lot of battle damage before it is shot down.



The crew of a Ju 88

Switching Positions in a Medium Bomber

In a medium bomber, you can fly as a pilot, bombardier, or gunner at a variety of gun positions. What's more, you can constantly switch between any or all of these positions in mid-flight. Use these keys to move around to all the positions. The pilot, gunner, and bombardier roles all have their own controls, and will be discussed in turn in this section.

Key	Function
P	Moves you to pilot position
G	Moves you to gunner position
B	Moves you to bombardier position
M	Sends you to In-Flight Map/Radio
7	Toggles you between pilot and gunner positions

Medium Bomber Cockpit Controls

Key	Function
+	Increases throttle (shift key not needed)
–	Decreases throttle
L	Lowers and raises landing gear
F	Lowers and raises flaps
D	Lowers and raises dive brakes (Ju 88 only)
C	Turns replay camera on and off
R	Sends you to Review Combat Film (see the *Pre-Flight* chapter)
A	Turns on the automatic pilot, or automatic shoot mode if you're manning a machine gun at the time
S	Lets you toggle between bombload settings
RETURN	Drops bombload
J	Lets you and your crew jump from bomber and parachute to safety
Q	Ends mission; sends you to post-flight evaluation

Medium Bomber View Controls

To look around your bomber in all directions, you can use either the number keys on the top of your keyboard or, if your keyboard has a keypad, use the keypad controls. On some computers, the keypad controls are labeled with arrows, and we recommend that you use them. For a further discussion of these controls, see cockpit instrument #10 in the *Medium Bomber Cockpit Instruments* section below.

Key		Function
8	(Up arrow)	Forward view (your mission starts in this direction)
6	(Right arrow)	View right
4	(Left arrow)	View left
3	(PgDn)	View straight down (regardless of your flight angle)
9	(PgUp)	Scan view (look completely around your bomber)

Medium Bomber Gunner Controls

From the pilot's position, you can move to the gunner position by pressing **G**, then pressing one of the keys in the chart below. The bomber will continue to fly with the controls set where you left them, unless you press **A** to turn on the autopilot before you leave the cockpit. If you go back to the pilot's position and press **G** again, you'll be sent to the last gunner position you manned.

To move around to all the gun positions, press any one of these keys:

Key	Function
8 (Up arrow)	Nose gunner
4 (Left arrow)	Left fuselage gunner (except Ju 88)
6 (Right arrow)	Right fuselage gunner (except Ju 88)
5 (Middle key)	Lower fuselage (rear) gunner
2 (Down arrow)	Upper fuselage (rear) gunner
7	Lets you toggle between pilot and gunner positions
A	Automatic shooting mode

Notice how the location of each gun corresponds with the numeric keypad key that sends you to that position. The location and key also correspond with the group of gun indicator lights in the cockpit that display the status of each gun (see the *Medium Bomber Cockpit Instruments* section for a description of these lights).

When you're in any of these gunner positions, use your controller to move the machine gun up, down, left, or right, and press your controller button to fire. The number displayed next to the machine gun indicates how many rounds of ammunition it has left. If you'd like for the machine gun to aim and shoot automatically, press **A.** A red light will come on to show that the gun is in the autoshoot mode. As long as it's in this mode, you won't be able to manually aim and shoot it. You'll also see gun indicator lights similar to those displayed in the cockpit, which indicate the status of all gunner positions. From any gun position, press **P** to return to the pilot's position, press **B** to move to the bombardier's position, or press **M** to get to the In-Flight Map/Radio.

Medium Bomber Bombardier Controls

When you press **B,** you'll find yourself looking down from the bomber as a bombardier would. In this position, you actually fly the bomber, so you can maneuver it into the best position to drop its bombload. To do this, move the controller around just like you would when you're piloting the bomber from the pilot's position. All of the cockpit controls will function, although you won't be able to use the cockpit view unless you press **P** and move back to the cockpit (see the *Medium Bomber Cockpit Controls* section for more information).

To help you maneuver your bomber into position you'll find four gauges: an altimeter, an airspeed indicator, a compass, and a banking indicator. You'll also find a bomb indicator panel, which shows you how many bombs are left, plus a switch which lets you choose how to drop your bombs. If the light on the left is lit, it indicates that only one bomb will drop every time you press **RETURN**. If the light on the right is lit, it indicates that all of your bombs will drop simultaneously when you press **RETURN**. To alternate between these two settings, press **S.** See the *Medium Bomber Cockpit Instruments* section for more information about these controls, and the *Flight Fundamentals and Tactics* chapter to learn how to drop a bombload accurately.

Medium Bomber Cockpit Instruments

Most of the same instruments found in a fighter's or dive bomber's cockpit are also used by a medium bomber. These are the instruments you'll see in front of you:

1. Altimeter This gives your distance from the ground in feet. The digital number indicates thousands of feet, the big hand on the dial indicates hundreds of feet, and the little hand tens of feet. For example, if the digital display reads "09," the big hand is on the "6," and the little hand on the "1," your altitude is 9,610 feet.

2. Climb/Dive Indicator This gauge gives you the rate your bomber is climbing or diving, in thousands of feet per minute. The **+** area of the gauge indicates a climb, while the **-** area indicates a descent.

3. Automatic Pilot Light This tells you if you've turned on your automatic pilot, which you activate by pressing the **A** key. You'll want to turn on the automatic pilot before moving to the bombardier or gunner position, otherwise the bomber will fly with the controls set where you left them.

4. Banking Indicator This shows the roll of your bomber (see the *Flight Fundamentals and Tactics* chapter for more information). The large horizontal bar shows the position of your wings relative to the ground, while the small vertical bar shows the direction your tail is pointing. As you bank your bomber left or right, the horizontal line will also bank to reflect your position.

5. Pitch Indicator This shows the position of the nose of your bomber relative to the horizon. **+** means your nose is pointing above the horizon, **0** is level with the horizon, and **-** indicates that your nose is pointing below the horizon.

6. Compass This shows which direction your bomber is headed: north, south, east, or west.

7. Airspeed Indicator This shows how fast your bomber is flying, in tens of miles per hour. For example, if the hand on the gauge is pointing to "20," you're flying at 200 miles per hour.

8. Gun Indicator Lights These lights show the status of each of your bomber's machine guns. The top light indicates the nose gun, the center light indicates the upper fuselage (or dorsal) gun, the left and right lights indicate the left and right fuselage guns, and the bottom

As more and more poorly-armed German bombers were lost to RAF fighter attacks, crews began to devise novel ways to protect their aircraft. He 111 crews would throw out reels of wire attached to tin boxes, to foul the propellers of the attacking enemy fighters. And Do 17 crews would toss hand grenades out of the windows at Hurricanes and Spitfires.

light indicates the lower fuselage (or belly) gun. The chart below tells you how to read these lights, which is crucial to defending your bomber.

Color of Light	**Gun Status**
Blue	Gun idle
Yellow	Enemy fighters approaching gun's field of fire; you could be attacked from that direction
Black	Gun out of ammunition or destroyed
Red	Gun switched on to automatic shoot mode
Green	Gun firing at enemy fighters in automatic shoot mode

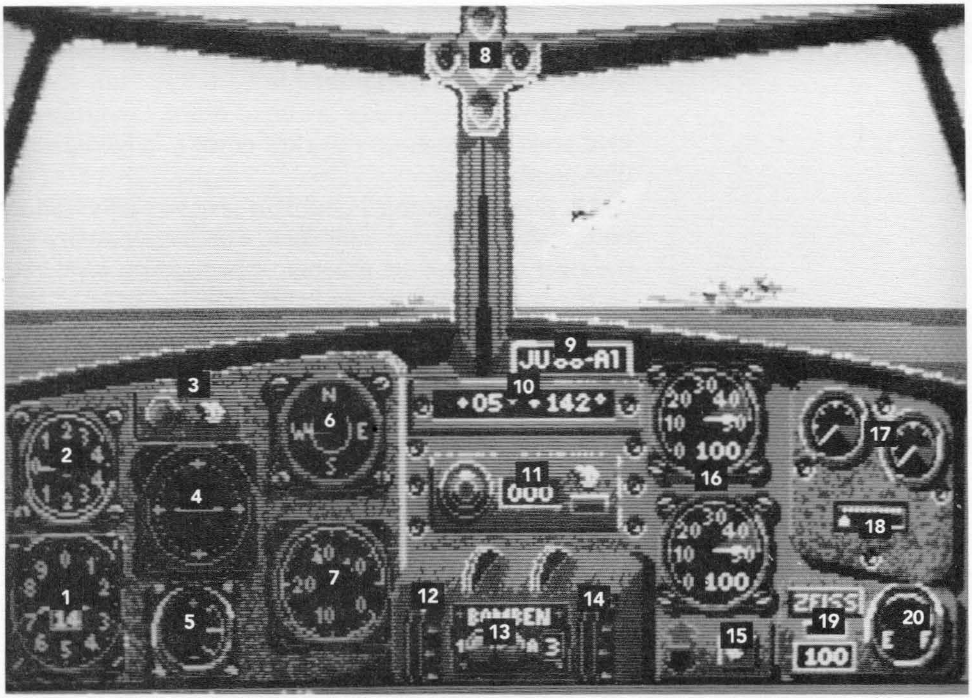
In some graphics modes on some computers, the colors may be different. Consult your Reference Card to see which colors are used by your computer.

When you begin your mission from the pilot's position, the guns will not be automatically shooting at enemy aircraft, and your bomber will be defenseless. To set your guns to fire automatically, press **G** to move into the gunner role (see the *Medium Bomber Gunner Controls* section to choose a particular gun position). Once you're in a position, press the **A** key. A red light on the machine gun barrel indicates that the gun is now in the autoshoot mode. Pressing **A** again turns off the autoshoot. If you want, you can stay and watch the machine gun automatically aim and fire at enemy fighters, but you can't manually move and shoot the gun when it's set on autoshoot. To activate this mode on all your guns, you must move into each individual gun position, and press **A**. Pressing **P** returns you to your pilot's seat. Your gun indicator lights will be red for every gun position in the autoshoot mode. The lights will flash green when the guns are automatically firing at enemy fighters.

In the early phase of the battle, Squadron Commander Peter Townshend intercepted a lone Do 17 on its way home from bombing the harbor at Lowestoft. Townshend's Hurricane riddled the Dornier, named *Gustav Marie*, with some 220 holes in the wings, fuselage, and engine. A lucky return burst of gunfire from the bomber hit the Hurricane's cooling system, and Townshend was forced to bail out over the Channel. But the *Gustav Marie*, bullet holes and all, made it back to France, where it made a wheels-up landing. Amazingly, every member of its crew survived.

9. Nameplate This gives the name and model number of your bomber.

10. View Indicator This panel shows which direction you're looking out of from your bomber. In normal flight, the panel will be blank. When you press the **4** key, the view out of your cockpit window will be the left view, and the word "LEFT" will be displayed on the view indicator. If your computer has enough memory, the cockpit screen will be replaced by a picture of the view



Cockpit of an He 111. For other medium bomber cockpits, see the *German and British Aircraft and Weapons* chapter.

looking over the left wing of your aircraft. Pressing the **6** key gives you the right view from the cockpit window with the word "RIGHT" displayed, or the view looking over the right wing of your bomber. Pressing the **3** key gives you the view straight down, and the word "DOWN" will be displayed.

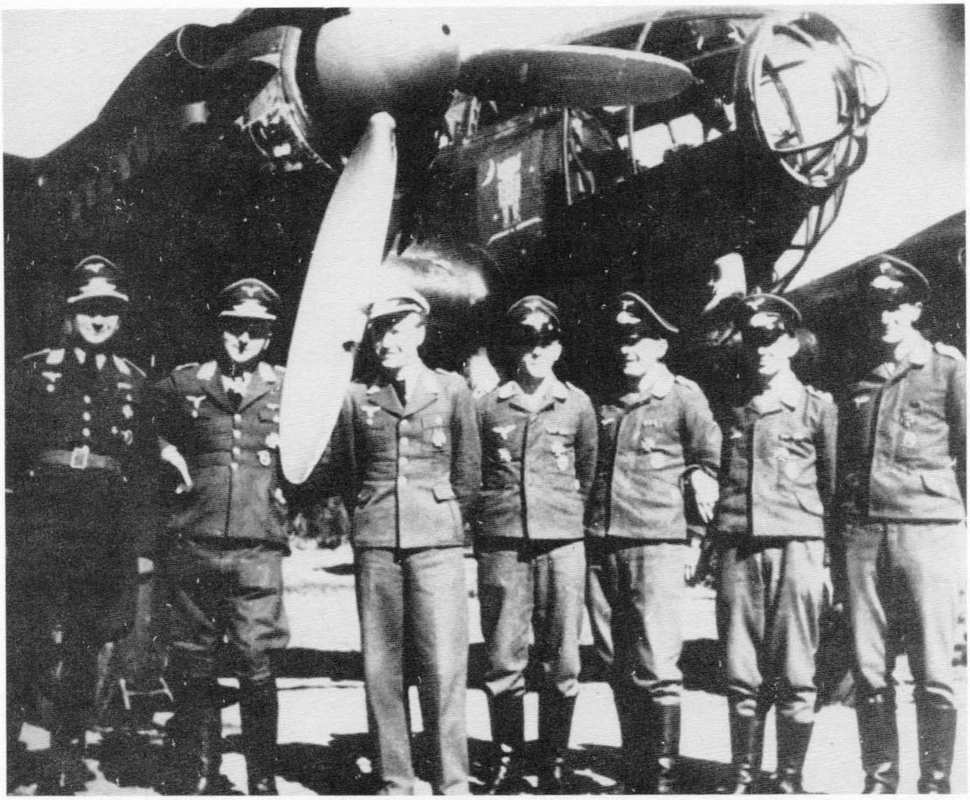
When you press the **9** key, you'll be in the scan mode. In this mode, you can look around your bomber in any direction by moving your controller, while your plane remains on course. Two numbers will be displayed on the view indicator. The first number shows how many degrees up or down you're looking, starting at 0° (level flight), and ranging from - 90° (straight down) to + 90° (straight up). The second number shows how many degrees you're looking around, beginning with 0° (straight ahead, your flight path). If you're looking toward the right, the number ranges from 0° to + 90° (directly right) to + 180° (behind you). If you're looking left, the number ranges from 0° to - 90° (directly left) to - 179° (just about straight behind you).

11. Radio This receiver has two important components. The three-digit number shows what frequency your radio is tuned to, while the light next to it will be lit when you've tuned into the correct frequency, which allows you to receive important mission information. To

tune or use your radio, press **M,** which moves you to the In-Flight Map/Radio.

12. Dive Brakes Lever (Ju 88 only) This shows whether your dive brakes are up or down. Lowering the dive brakes is necessary to slow down a Ju 88 during a dive-bombing run.

13. Bomb Indicator Panel This give you information on the status of your bombload. The large number on the right indicates the number of bombs you have left. To the left, you'll see two lights, one marked "1," the



Officers of an He 111 *staffel*

other marked "A." If the light next to the "1" is on, one bomb will drop when you press **RETURN**. If the light next to the "A" is on, your entire bombload will drop consecutively when you press **RETURN**. To toggle between these two lights, press the **S** key.

14. Flaps Lever This gives you the position of your bomber's flaps. If it is in the up position, the flaps are up; if it is in the down position, the flaps are down. During normal flight your flaps should be up, but for takeoffs and landings, they should be down to increase your bomber's lift and lower its stalling speed.

15. Landing Gear Indicator This shows the status of your landing gear. If the up arrow is lit, your landing gear is up; if the down arrow is lit, your landing gear is down. Don't forget to lower your landing gear for a landing, or to raise it after takeoff. Lowering your landing gear has the effect of slowing your airspeed, which may be useful in certain situations.

16. RPM Indicators (One per engine) These two identical gauges give you two readings. The dial shows the number of revolutions per minute (RPMs) the engine is delivering, in units of one hundred. The higher the RPMs, the farther to the right the dial will move. If the throttle setting is at "75" or higher, or if the dial moves into the red area, you'll be using up fuel at a higher rate. The white number at the bottom of the gauge shows the throttle or power setting of the engine. For example, if it reads "65," your engine is set for 65 percent of the power it can produce.

17. Engine Damage Indicators (One per engine) These two identical dials show the amount of damage sustained by your bomber's engines in combat. If the indicator moves into the red area, the power output of that engine will be severely reduced and your RPM indicator reading will drop. You may then have to abort the mission and return to your home base, or even bail out.

18. Airframe Damage Indicator This gauge shows the amount of structural damage done to your bomber in combat. When the indicator is in the red zone, your aircraft is severely damaged and may go out of control, forcing you to bail out.

19. Replay Camera Indicator This shows the percentage of film you have left in your replay camera when you are recording. The number on the indicator will decrease until you're out of film. When you press **C** to turn on your replay camera, a light above the indicator will go on, and stay on until you have turned your camera off, or used up all the film.

20. Fuel Gauge This shows how much fuel remains in your bomber's fuel tanks: **E** means empty, **F** means full.

"We saw one comrade after another, old and tested brothers in combat, vanish from our ranks. Not a day passed without a place remaining empty at the mess table."

Luftwaffe Major Adolf Galland

The cockpit and nose gun of a Do 17. The bar on top of the canopy held the radio antenna.



IN-FLIGHT MAP/RADIO

To examine the In-Flight Map, receive important mission information, and tune and use the radio of your plane, you'll need to move to the In-Flight Map/Radio. You can do this by pressing **M** from any crew position during a mission.

In-Flight Map

Once you're at the In-Flight Map/Radio screen, you'll see a map of the English Channel, Southern England, and the west coast of France. In the upper part of the screen, the words "IN-FLIGHT MAP" will be displayed, along with the historical date and time of your mission.

On the map of Southern England and the west coast of France, you'll see small colored icons scattered about. These icons represent various ground installations, including RAF airfields, factories, and radar sites, plus Luftwaffe airfields in France. To get more information about each of these installations, move the arrow over the icon. You'll then see the information listed in a column on the right, under the heading MAP ID. This information includes the name of the installation, a description of it, and its status (whether it is operational, or if it has been damaged or destroyed by any previous action). If your radio is tuned properly, you'll also be shown the distance this installation is from your plane, and the heading your plane needs to take to reach it.

In-Flight Radio

Whenever you're flying a mission, the radio is a valuable source of information. You can use the radio to determine the position of your aircraft, and have it appear on the map as an icon. The radio will also give you reports of aircraft and ship sightings in the battle area. If you're flying as an RAF pilot, these sightings are radioed to you from the RDF system; if you're flying for the Luftwaffe, these sightings come from other German planes in the area. The most recent sighting reports will also show up as icons on the map, and will be updated every five minutes. To get this information click on the AIR/SEA ID button at the bottom of the screen. Then click on the ship or plane icon on the map. Information about the sighting will be displayed in the column on the right of your screen. To cycle through all the available sightings, click on either the NEXT FWD or NEXT BACK button. To view the map containing information about ground installations again, click on the LAND ID button at the bottom of the screen.

"Men love war because it is the one thing that stops women {from} laughing at them."
John Fowles

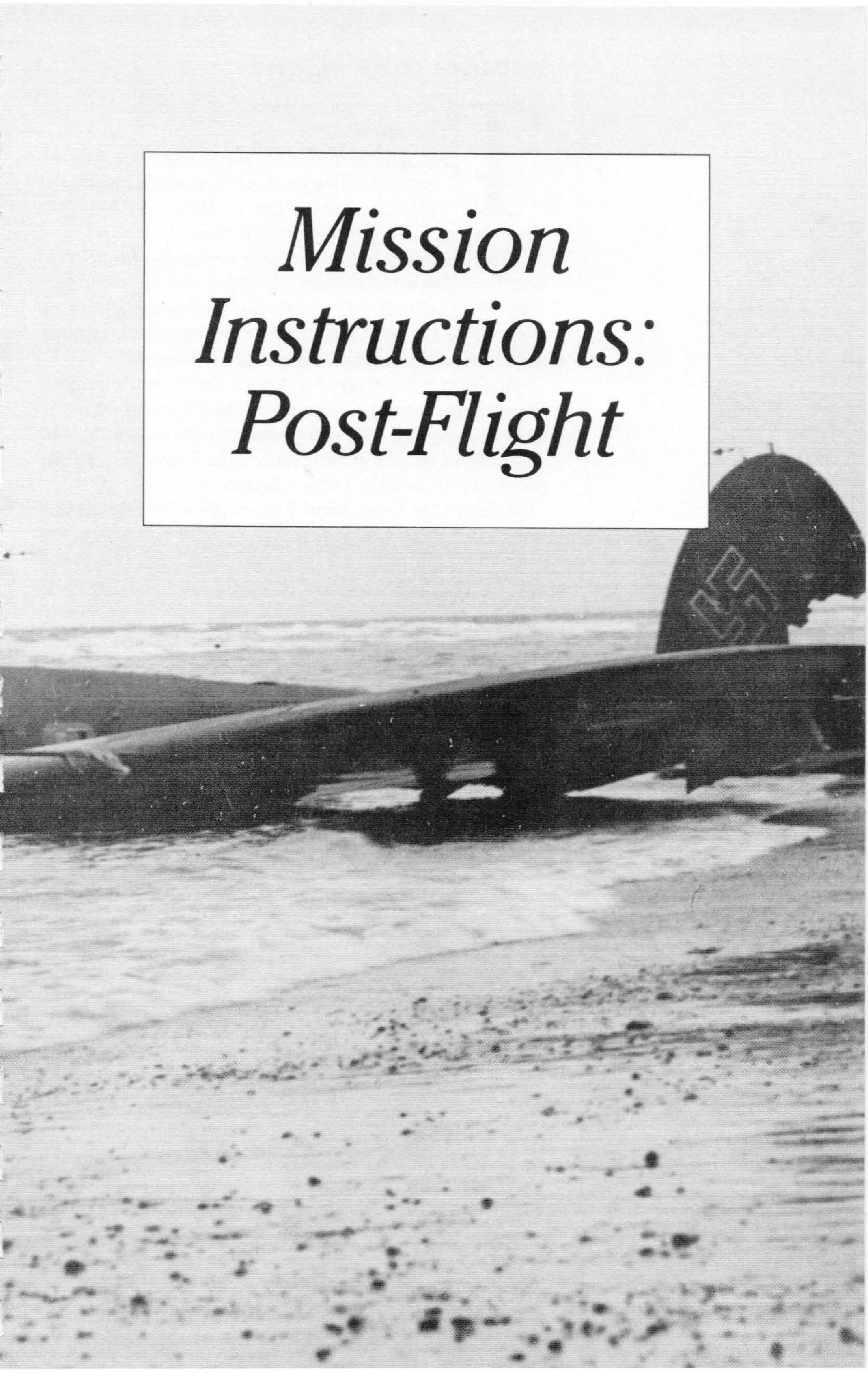
Tuning Your Radio

If the radio icon in the upper right-hand corner of the screen is lit, the radio is correctly tuned and you'll be able to receive information. If the icon is not lit, you'll need to tune your radio. To do this, pull out the Frequency Cipher Wheel, which you'll find inside the game box. Move the arrow to TUNE RADIO, located at the bottom of the screen, and click the button. Now you'll see a unit insignia, plus the name of an airfield, in the column at the right of the screen. Line up the notch on the Frequency Cipher Wheel so that the unit insignia on the wheel matches the one on the screen. Next, look at the window on the Frequency Cipher Wheel that displays the same airfield name that is on the screen. Beside the airfield name on the Frequency Cipher Wheel, you'll find a window with three colored numbers inside it. These three numbers together make up your correct radio frequency. Use the arrow to select the correct frequency and correct color from the display on the screen.

To continue your flight, move the arrow to the box titled CONTINUE and click your controller button.



Mission Instructions: Post-Flight



ENDING YOUR FLIGHT

There are many ways that your mission can be ended:

Crashing If your plane smashes into the ground or water at a sharp angle before the pilot and crew has a chance to bail out, they are considered to be lost in action.

Crash Landing If your plane is forced down or lands poorly, and is a total wreck, the pilot and crew will survive. However, if this crash landing takes place on enemy soil, the pilot and crew will be captured, and will not be able to take part in any more missions.

Ditching If your plane splashes down in the English Channel, it cannot be recovered. The pilot and crew will survive, however, and will be rescued by a passing ship or a rescue seaplane from their side. They then will be able to participate in a new mission.

Bailing Out Over Land If your plane is plummeting down over land, and you press **J** before it crashes, the pilot and crew will parachute out of the plane. If the pilot and crew bail out over enemy territory, they will be captured, and cannot be used on any more missions. If they bail out over friendly territory, they will be transported back to their airfield for another mission.

> **"The Battle of France is over. I expect the Battle of Britain to begin. The whole fury and might of the enemy must very soon be turned on us."**
> **Winston Churchill, in a speech to the House of Commons, June 18, 1940**

Bailing Out Over Water If the pilot and crew parachute from their plane over the English Channel, they will be rescued and can fly again.

Landing At Your Home Airfield Your mission also ends when you fly back to your home airfield, land safely, and press **Q**.

Pressing Q in Mid-Flight If you don't want to make a landing, you may also press **Q** at any time to end your mission. This will not affect the Combat Record score for your pilot and crew, unless they are captured or the aircraft is lost, which can happen by:

• Pressing **Q** while flying over enemy territory. If this happens, the pilot and crew will be captured and the aircraft lost.

• Pressing **Q** while flying over the Channel. If this happens, the plane will be lost, but the pilot and crew will be rescued.

To avoid losing your aircraft, or having your pilot or crew captured, press **Q** when you're over England if you're a British pilot. If you're a Luftwaffe pilot, try to fly to the coast of Continental Europe before pressing **Q.**

Preceding page: One He 111 that didn't make it back across the Channel

MISSION RESULTS

When your mission has ended you'll see a Mission Evaluation screen. The chart in the center of the screen will list the type of RAF or Luftwaffe aircraft that saw action in that mission, and how many were destroyed or damaged. The numbers in parentheses indicate the number of aircraft shot down or damaged by your own plane. At the bottom of the screen, you'll find a chart that shows which ground installations were destroyed or damaged, and which ship convoys were hit or sunk during your mission.

Updating Combat Records

After a pilot or crew has completed the mission you assigned them to fly, their Combat Records will be updated to reflect their successes and failures. These Combat Records will be displayed after the Mission Evaluation screen. Any additional pilots or crews that you have selected from the Flight Roster to participate in a mission will also have their Combat Records updated. Each pilot or crew also has a cumulative score as part of their Record. This score is based on a ranking

WERNER MOLDERS



The leading German ace in the Battle of Britain, Werner Molders, like so many other Luftwaffe commanders, saw his career blossom during the Spanish Civil War. There, flying the first Bf 109 fighters, he developed the *Rotte* formation, in which pilots flew close together in pairs, and the *Schwarm*, in which they flew in formations of four. These air combat tactics were later adopted by the Luftwaffe and used during the Battle of Britain. In Spain Molders shot down fourteen Republican aircraft, and added twenty-five French and British aircraft to his total during the fall of France, earning the coveted Knight's Cross in the process. His aerial combat feats were all the more remarkable considering that he failed his first physical exam because of air sickness, and chronically suffered from it for the rest of his career. During the Battle of Britain, Molders commanded the one hundred fighters of *Jagdgeschwader* 51, and by the middle of October 1940, he had shot down forty-five RAF fighters. A somber, deeply religious man, Molders was given the nickname *Vati*, or "Daddy." At age twenty-eight, he was appointed general of fighters for the Luftwaffe, and continued to excel at shooting down aircraft, this time on the Russian Front. His victory total had reached 115 when, on November 17, 1941, he was called to serve as a pallbearer at the funeral of Ernst Udet. On his way to Berlin, Molders was killed when the He 111 in which he was riding crashed during a storm.

Congratulations are given to this ace pilot for another successful RAF fighter mission



system, and allows you to compare pilots and crews to one another. It too will be updated after every mission.

Pilots and crews will achieve higher scores if the main objectives of their missions are accomplished. If you're an RAF pilot, your main mission objective is to prevent ground installations, ship convoys, and other RAF fighters from being destroyed in Luftwaffe bombing attacks. If you're flying a Luftwaffe medium bomber or dive bomber, your main mission objective is to bomb the target acccurately. Since knocking out a target is a group objective, if other bomber crews also score direct hits on a target, your individual score will improve. If you're flying a Luftwaffe fighter as an escort, your main mission objective is to protect the bombers from enemy fighter attack so they can drop their bombloads over the target. The more bombs that hit the target, and the more bombers that survive, the higher your score will be. If you're flying a Luftwaffe fighter in a free-ranging role, your main mission objective is to shoot down as many RAF fighters as you can. The greater the ratio of RAF fighter losses to Luftwaffe fighter losses, the higher your score will be.

No matter which mission you choose to fly, helping your fellow pilots and crews to survive and complete their missions will increase your score.

Campaign Results

If you're flying a Campaign Mission, a chart will be displayed after the Combat Records screen. This chart will summarize the impact of your last mission on the Battle of Britain as a whole. It will also tell you how the Battle is shaping up, and which side is closer to victory.

MEDALS AND PROMOTIONS

Whether you're an RAF pilot or a Luftwaffe pilot or crew member, medals and promotions in rank will be awarded if you and your fellow fliers repeatedly fulfill mission objectives and have outstanding flights. The following honors were bestowed upon those who distinguished themselves in battle in 1940.

RAF Medals (Listed in order of rank)

Victoria Cross

The highest award in the Royal Army, Navy, and Air Force, the Victoria Cross was given to officers or enlisted men for "most conspicuous bravery or preeminent act of valour, self-sacrifice, or extreme devotion to duty in the presence of the enemy." Some 1,346 Victoria Crosses have been awarded since the decoration was originally established by Queen Victoria in 1856. Flight Commander James Nicolson was the one RAF Fighter Command pilot to receive this award for combat action during the Battle of Britain.

George Cross

Established in 1940, this medal was awarded to men and women for deeds of bravery, either against an enemy, or in peacetime. It is the second-highest British decoration, ranking only below the Victoria Cross.

Distinguished Service Order

Awarded for meritorious service while engaging an enemy, the Distinguished Service Order was established in 1886. It was given to officers and warrant officers of the Royal Army, Navy, Marines, or Air Force for numerous acts of bravery, rather than for a single individual act. If a recipient had already received a Distinguished Service Order, they were awarded bars, which were worn on the ribbon of the medal.

Distinguished Flying Cross

This medal was awarded to Royal Air Force officers and warrant officers for courage and valor while flying against an enemy. Like the Distinguished Service Order, it was usually given for several acts of bravery. Bars were awarded if a person had already won this medal for previous actions.

Battle of Britain Star

This was given to all Fighter Command aircrews who flew at least one sortie against the Luftwaffe between July 10 and October 31, 1940.

After recording his seventeenth kill, Luftwaffe Major Adolf Galland was awarded the Knight's Cross. As Feldmarschall Albert Kesselring pinned the medal on Galland, a pair of fighters flew overhead. Kesselring asked Galland what kind of aircraft they were. "Spitfires, Herr General Feldmarschall," replied Galland. "The first to congratulate you," said Kesselring with a laugh.

Luftwaffe Medals

Knight's Cross of the Iron Cross

This was the highest award in the German military, and was given for valor and heroism against an enemy. Luftwaffe fighter pilots could be awarded the Knight's Cross for shooting down a set number of enemy planes. Werner Molders was awarded the Knight's Cross for shooting down twenty aircraft, while Adolf Galland



The two most decorated Luftwaffe fighter pilots of the Battle of Britain — Adolf Galland and Werner Molders.

received his for downing seventeen. Molders and Galland were also the first fighter pilots to receive Oak Leaves, which were awarded if a pilot recorded forty aerial victories, and worn on the Knight's Cross. Swords were given when a pilot reached seventy victories (Galland was the first to do so), while Diamonds were awarded for one hundred victories (a mark Molders was first to reach). Both the awards of Swords and Diamonds were initiated specifically by Hitler to honor these extraordinary accomplishments of Luftwaffe fighter pilots.

Iron Cross First Class

This medal was first instituted in 1813, and reinstated in 1870 and 1914. It was awarded for an outstanding feat of heroism, and usually given when the individual had already received the Iron Cross Second Class.

Iron Cross Second Class

This award was commonly given for acts of bravery or distinguished service by the German military.

Wound Badge

This medal was reinstated by Hitler in 1939, with three different classes. If an individual in the German military was wounded one or two times, he earned a black badge. If he was wounded three or four times, or lost an eye, a hand, a foot, or his hearing, he received a silver badge. If he was wounded five or more times, lost his eyesight, suffered brain damage, or was totally disabled, he was awarded a gold badge.

Ranks and Promotions

For both the Luftwaffe and the RAF, promotions in rank were awarded to those pilots who demonstrated success in battle and exhibited qualities of leadership. New Luftwaffe pilots began their careers with the rank of Leutnant, while new RAF pilots started out with the rank of Pilot Officer.

World War II Commissioned Officers' Ranks

Luftwaffe	RAF	U.S. Army Air Force (for comparison)
Oberst	Group Captain	Colonel
Oberstleutnant	Wing Commander	Lieutenant Colonel
Major	Squadron Leader	Major
Hauptmann	Flying Lieutenant	Captain
Oberleutnant	Flying Officer	First Lieutenant
Leutnant	Pilot Officer	Second Lieutenant

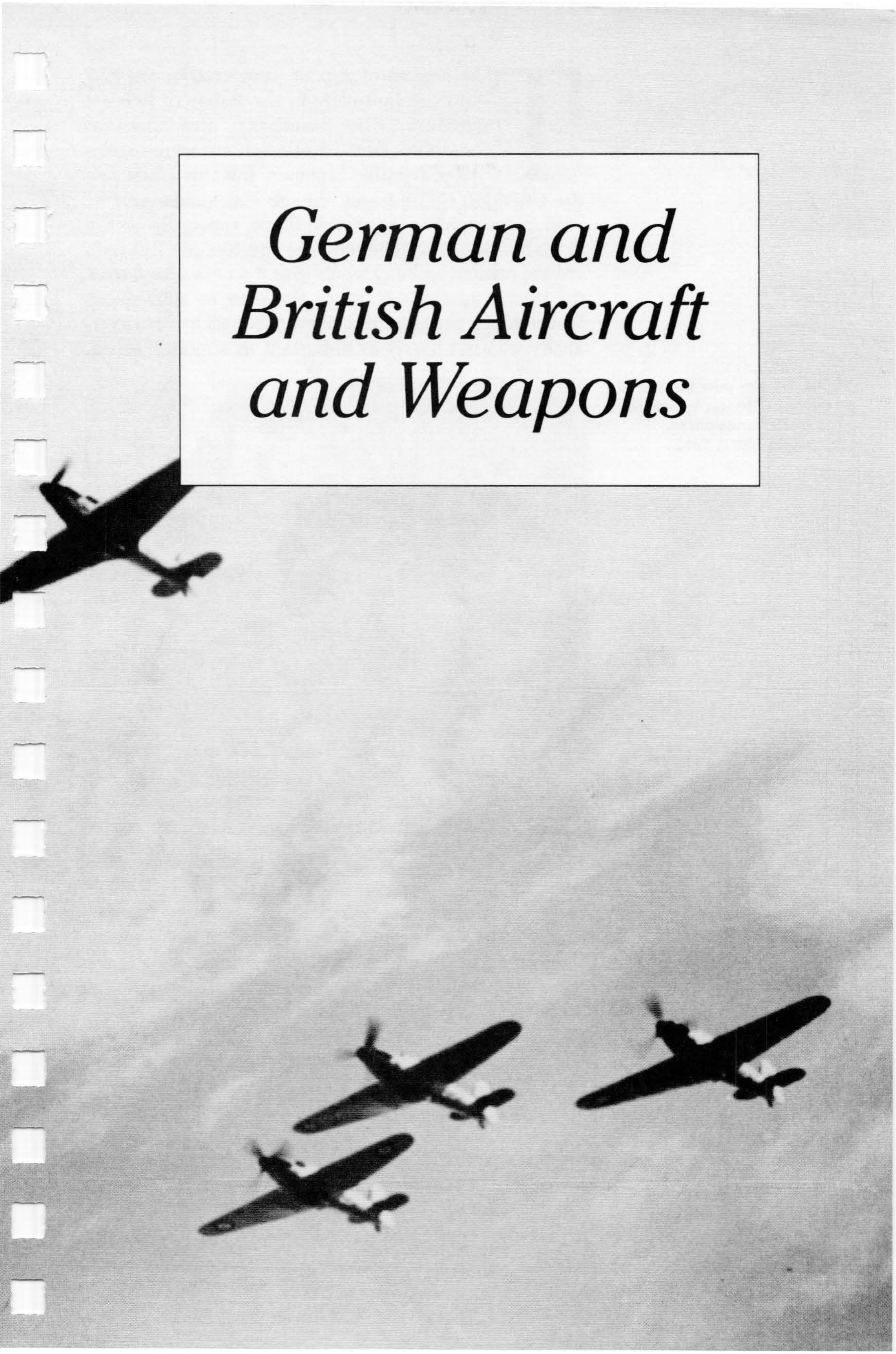
AL DEERE



Perhaps the luckiest RAF pilot of the Battle of Britain, Al Deere was nevertheless one of the most skilled pilots as well. Born in New Zealand, Deere joined the RAF in 1937. He shot down three Bf 109s during his first day of combat. While fighting in Belgium in 1940, Deere was forced to crash-land his Spitfire, and by taking a bus, riding a bicycle, and walking, he managed to get to Dunkirk in time for the evacuation. During the early part of the Battle of Britain, Deere, now a squadron commander with 11 Group, survived a head-on collision with a Bf 109. Later, when his Spitfire was taking off from Hornchurch airfield, it was hit by a bomb from a Do 17. The explosion blasted off a wing and the engine, and the plane slid for 100 yards on its back. His face full of dirt, Deere managed to crawl out through a tiny opening in the wreckage, and was flying again the next day. Altogether, Deere survived an amazing nine bail outs or crash landings, while notching twenty-one aerial victories during the war.



German and British Aircraft and Weapons



Three types of aircraft were used by the RAF and the Luftwaffe in the Battle of Britain: fighters, dive bombers, and medium bombers. World War I fighters were highly-maneuverable biplanes, but the 1930s saw the evolution of the faster, though less maneuverable, monoplane fighter. There were those, especially on the British side, who believed that the biplane fighter's greater maneuverability would give it an advantage over the swifter monoplane fighter. However, as subsequent World War II aerial battles proved, superior maneuverability was not nearly as important as superior speed.

An He 111 flies over the S-bend in the River Thames in London — a familiar landmark to Luftwaffe pilots in 1940



The faster a fighter was, the quicker it could move into a favorable position from which to attack a slower, though perhaps more maneuverable, enemy. These new fighters also had metal wings strong enough to hold as many as eight machine guns, while the biplanes could only carry two fuselage-mounted machine guns. Although the British had some biplane fighters in use during the latter part of 1940, they were stationed away from heavy fighting and eventually replaced altogether. In the Battle of Britain, the RAF mainly relied on two monoplane fighters, the single-engine Supermarine Spitfire and the Hawker Hurricane. The Luftwaffe flew the single-engine Messerschmitt Bf 109 and the twin-engine Messerschmitt Bf 110, both monoplane fighters.

Preceeding page: A squadron of Hurricanes in three-plane vic formations. *Courtesy of the Imperial War Museum*

Like the monoplane fighter, the dive bomber also evolved between the two world wars. The theory that

called for using a plane to dive steeply on a target, drop its bombs from a relatively short distance, and pull out in time to escape the blast was first tested by the U.S. Navy. In 1933, German pilot Ernst Udet used a couple of obsolete American-made Curtiss *Helldiver* biplanes to demonstrate the accuracy of dive-bombing to the German Air Ministry. The demonstration was impressive, and eventually resulted in the development of the Junkers Ju 87 Stuka dive bomber. The single-engine Stuka was a formidable weapon in the conquest of Europe, when it attacked ground targets in coordination with German troops. It saw more action in the Battle of Britain than any other dive bomber, although the larger, twin-engine Junkers Ju 88 was sometimes used in this role.

Though not as accurate as a dive bomber, the twin-engine medium bomber could carry a greater bombload. On the German side, these aircraft were originally developed as *Schnellbombers*, or bombers that could fly faster than the fighters that were attacking them. During the Spanish Civil War, the *Schnellbomber* proved to be successful against the slower, obsolete opposition fighters. But in the Battle of Britain, British Spitfire and Hurricane fighters were much faster than the Luftwaffe medium bombers, which resulted in heavy losses for the

REGINALD MITCHELL



The chief designer at the Supermarine aircraft company, Reginald Mitchell designed a monoplane seaplane which broke world speed records in 1931, reaching 407 1/2 MPH. He wanted to apply this design to a new monoplane fighter, and submitted a report to the Air Ministry. In 1933, a prototype of the design was built, but Mitchell, gravely ill with tuberculosis, was forced to stop working and undergo a lung operation. While convalescing on the Continent, Mitchell spoke with German aviators and became convinced that war with Germany was imminent. Ignoring medical advice, he refused to rest, and plunged into the development of his fighter, which he believed could affect the outcome of the next war. He determined that his new prototype was unsatisfactory, and began working on radical alterations to his design, among which were thin wings with rounded tips. These changes resulted in numerous production delays, but finally in March of 1936, a prototype of this radical new plane made its first flight. Sadly, Mitchell never lived to see the success of his fighter in the Battle of Britain, for he died on July 11, 1937, at age forty-two, having sacrificed his health — and ultimately his life — for the Spitfire.

German air force. Like the dive bomber, the medium bomber was designed to bomb targets in concert with an attacking army; Goering himself cancelled the development of a longer-range heavy bomber, since he did not see the need for one. This proved to be a mistake that would come back to haunt Germany, as many of Britain's factories and airfields could have been hit by heavy bombers but were out of range of the Luftwaffe medium bombers. During the Battle of Britain, the main German medium bombers were the Dornier Do 17, the Heinkel He 111, and the Ju 88.

RAF AND LUFTWAFFE AIR UNIT DESIGNATIONS

In 1936 the RAF was reorganized and divided into "commands," each of which was a large operational unit consisting of aircraft with the same function and responsibility. The major commands were Bomber Command,

WILLY MESSERSCHMITT



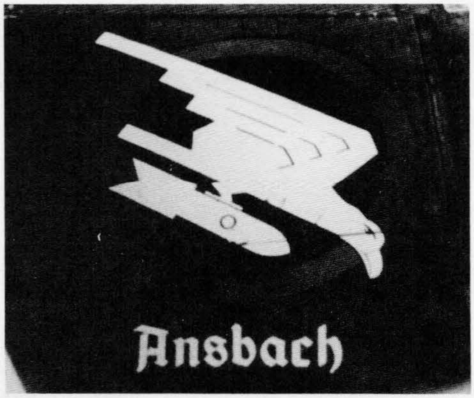
The German aircraft genius who supplied the Luftwaffe with some of its best aircraft, Willy Messerschmitt built his first glider in 1914 at age sixteen. At eighteen he joined the military flying school at Schleissheim, and after becoming a business partner of German aviator Friedrich Harth, he bought the Bavarian Aircraft Works, which had been founded by Ernst Udet. A lover of monoplanes, as evidenced by his own early glider designs, Messerschmitt designed a fast, single-seat monoplane fighter light enough to utilize the relatively low-powered German civil aviation engines. The first large-scale-production version of this aircraft, the Bf 109E, rolled off the assembly line in 1938, and it became the mainstay fighter of the Luftwaffe for the remainder of the war. Messerschmitt also designed the twin-engine Bf 110, a fighter which was successful in the conquest of Continental Europe but a failure in the Battle of Britain. But his replacements for the Bf 110, the Me 210 and the Me 410, proved to be poor-handling disasters, and the 110 was kept in production throughout the war. Messerschmitt's other contributions to the war effort included the enormous six-engine Gigant troop transport, and the fastest, most radical aircraft of the period, the rocket-powered Me 163 Komet fighter. But perhaps the finest aircraft he ever designed was one which could have changed the course of the war, the Me 262 jet fighter. Unfortunately, the German General Staff forbid him to work on it, insisting he produce more 109s instead. Messerschmitt secretly pursued the project, but when Hitler finally saw the jet in flight, he decided that it should be used as a bomber, and the resulting modifications delayed it even more. The Me 262 fighter saw large-scale production in 1944 and 1945, but it was not enough to prevent Germany's defeat.

Fighter Command, Coastal Command, and Training Command. After war was declared in 1939, Fighter Command, the new fighter arm in charge of defending Britain from aerial attack, divided fighter coverage into four "groups," with each group responsible for covering a designated area of Britain. (See the *Historical Overview* chapter for a map of the area each group covered.) These groups were in turn divided into "sectors" with the most important airfield within a sector designated as the "sector station." At various airfields within each sector were "squadrons," each of which consisted of twelve aircraft. Each squadron was broken up into two "flights" of six aircraft, designated "A" and "B." In turn, each flight was broken up into two "sections" of three aircraft, and given the designation "red," "yellow," "blue," or "green." Two or more squadrons were sometimes joined together to form a "wing," and three to five squadrons formed a "big wing." (See the maps at the back of the manual for more information.)

"The disintegration of nations will be accomplished directly by aerial forces."

Italian General Guilio Douhet

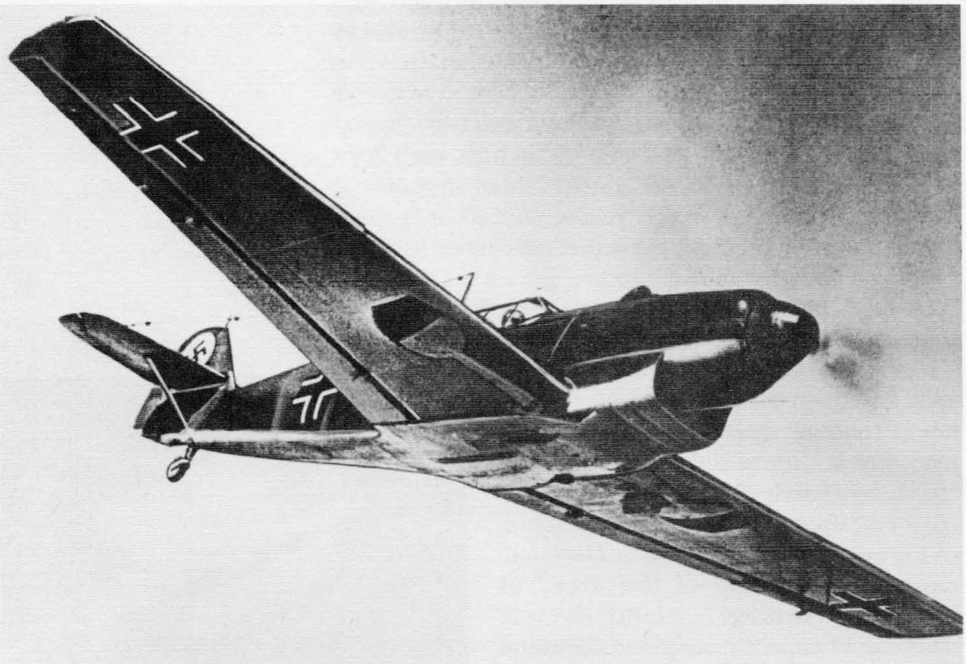
Unlike the RAF, the Luftwaffe did not split up command of its aircraft according to function. Instead, it was divided into five self-contained air fleets, or "*Luftflotten,*" each of which was responsible for air operations over a given section of Europe. (See the *Historical Overview* chapter for a map of the areas of Luftflotten coverage.) A Luftflotte was made up of approximately one thousand fighters, bombers, transports, and reconnaissance planes, and was in turn divided into two "*Fliegerkorps,*" consisting of these four types of aircraft. As the war progressed, the *Fliegerkorps,* which had started out as units of mixed aircraft, became more specialized. Within each *Fliegerkorps* were three to six "*Geschwader,*" which were specialized units of around 80 to 120 aircraft. Each *Geschwader* was named for the type of aircraft in the unit. A "*Jagdgeschwader*" (JG) was a fighter unit, "*Kampfgeschwader*" (KG) a bomber unit, "*Stukageschwader*" (St.G) a Stuka dive bomber unit, and "*Zerstorergeschwader*" (ZG) a Bf 110 *Zerstorer* unit. These *Geschwader* were divided into "*Gruppen*" of about thirty aircraft, which were usually based at the same airfield. Each *Gruppe* was divided into three "*Staffeln,*" and each *Staffel* consisted of nine or ten of the same aircraft. (See the maps at the back of the manual for more information.)



The insignia of an He 111 *staffel*

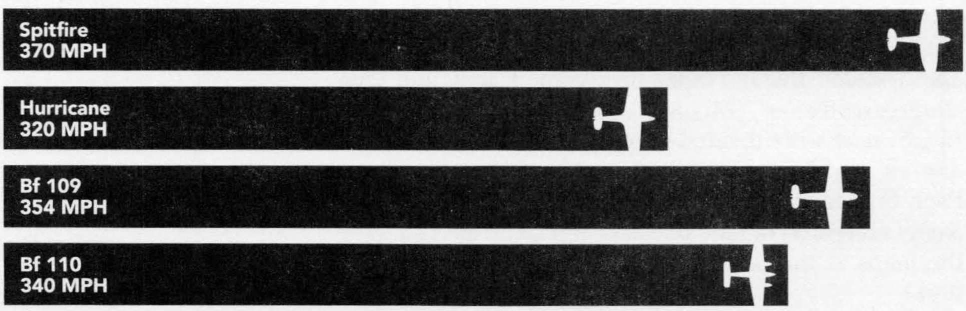
Messerschmitt Bf 109E-3 *Emil* Fighter

One of the greatest fighter aircraft of the Second World War or of any war, the Bf 109 was a mainstay of the Luftwaffe from the time of Spanish Civil War right up until the defeat of the Third Reich. Nearly thirty-five



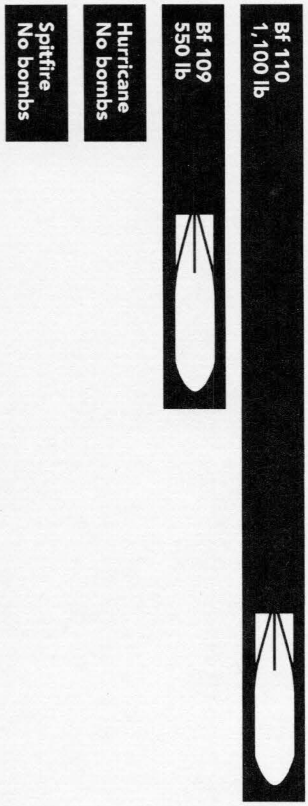
thousand Bf 109s were produced, more than any other fighter of that era. Bf 109s saw service in nearly every German offensive of World War II, and were the only German single-seat fighters used in the Battle of Britain. There the Bf 109s, with their small, stubby wings, were an even match for the Spitfire, and swifter and more maneuverable than any of the other British fighters.

Top Speed, Fighters



The Bf 109E-3 was developed in 1939 as a faster, more heavily-armed improvement over the earlier models, the Bf 109B and C, which had been deadly in the Spanish Civil War. (Although designed by Willy Messerschmitt, the Bf 109 was named after his company at the time, *Bayerische Flugzeugwerke*.) The *Emil* featured a more powerful and reliable Daimler Benz 601Aa engine, as well as 20 mm cannons in the wings in place of machine guns. The Bf 109E-3 saw service in the invasion of Denmark and Norway, and in the campaigns against France, the Netherlands, Belgium, and Luxembourg, where it gained a fearsome reputation.

Bombload, Fighters

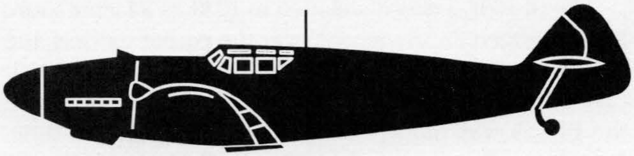


Messerschmitt Bf 109E-4/B *Jabo* Fighter/Bomber

As the Bf 109E-3 was tested in battle, certain modifications were made based on its combat performance. This new version, the Bf 109E-4, had a redesigned and reinforced canopy for better visibility and durability, plus more powerful wing-mounted cannons. When it was later decided to use the Bf 109E-4 as a *Jabo*, or fighter/bomber, a bomb rack was mounted underneath the fuselage. This model, the Bf 109E-4/B, saw its first action in July 1940 against convoys in the English Channel, and was also used against coastal radar stations in the Battle of Britain.

The Bf 109E-3 and E-4/B were fast, agile fighters that could dive and climb quickly. These planes had a tighter turning radius than either the Spitfire or the Hurricane, though few pilots found this out because they were afraid that the stubby wings would break off. Like the Spitfire, the Bf 109 was a joy to fly at medium speeds, but tougher to handle at high speeds, and could easily tire its pilot in a dogfight. Takeoffs and landings were also tricky, because the Bf 109s had a tendency to swing right or left. During the Battle of Britain, their limited range became a factor, since they could only fly as far as London and back. As a result, the longer-range bombers they escorted would sometimes be left unprotected, and many Bf 109 pilots were forced to ditch in the Channel when they ran out of fuel.





Bf 109E-3 Performance
Powerplant: one Daimler Benz DB 601Aa 12-cylinder liquid-cooled engine
Horsepower: 1,100
Top speed: 354 miles per hour
Rate of climb: 3,280 feet per minute
Ceiling: 34,450 feet
Range: 410 miles
Crew: one

Dimensions
Wingspan: 32 feet 4 inches
Wing area: 174 square feet
Length: 28 feet 4 inches
Height: 8 feet 2 inches

Weights
Empty: 4,189 pounds
Loaded: 5,520 pounds

Armament
Guns: two 20 mm MG FF cannons with 60 rounds per gun, mounted in the wings. Two 7.92 mm Rheinmetall Borsig MG 17 machine guns with 1,000 rounds per gun, mounted in the fuselage.

Bf 109E-4/B Performance
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Length: 28 feet 4 inches
Height: 8 feet 2 inches

Weights
Empty: 4,189 pounds
Loaded: 5,875 pounds

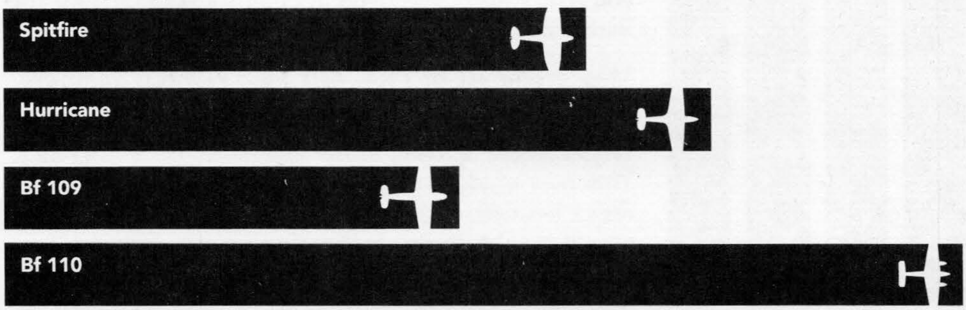
Armament
Guns: two 20 mm MG FF/M cannons with 60 rounds per gun, mounted in the wings. Two 7.92 mm Rheinmetall Borsig MG 17 machine guns with 1,000 rounds per gun, mounted in the fuselage.
Warhead load: one 110 pound bomb, or one 550 pound bomb, mounted beneath the fuselage



1. Radio
2. Bomb Release Light (Bf 109E-4/B *Jabo* fighter/bombers only)
3. Flaps Lever
4. Compass
5. Climb/Dive Indicator
6. RPM Indicator
7. Banking Indicator
8. Ammunition Round Indicators
9. Gunsight
10. View Indicator
11. Nameplate
12. Altimeter
13. Airspeed Indicator
14. Engine Damage Indicator
15. Airframe Damage Indicator
16. Pitch Indicator
17. Replay Camera Indicator
18. Fuel Gauge
19. Landing Gear Lever

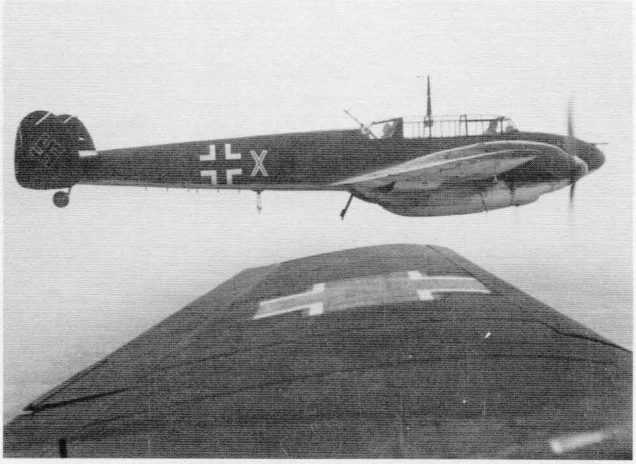
Cockpit of a Bf 109

Durability, Fighters



Messerschmitt Bf 110C-4 *Zerstorer* Fighter

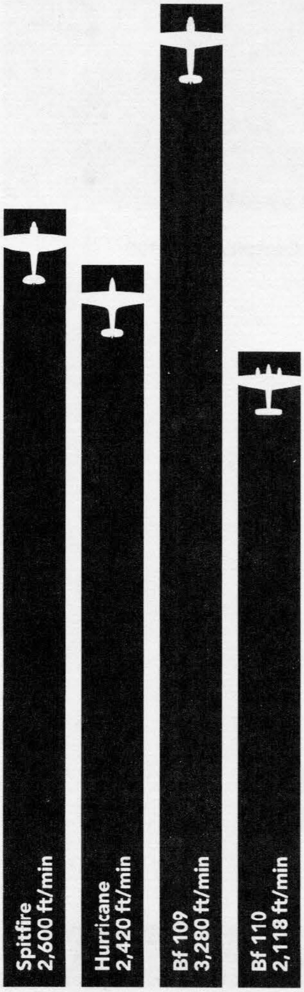
Noted for its sleek design and distinctive twin rudders and engines, the versatile Bf 110 served in a variety of roles during World War II. Heavily armed with two cannons and four machine guns in its nose, the *Zerstorer*, or "destroyer," was originally designed as a fast, long-range fighter that could escort bombers deep into enemy territory, while blowing any opposition fighters out of the sky. During the invasion of Poland in 1939 Bf



110s proved successful in this role, and were also used to destroy Polish airfields and communications lines. As a fighter and a close-support weapon for the German Army, the Bf 110 was highly effective in the invasion of Denmark, Norway, and the Low Countries, as well as in the Battle of France.

The Bf 110C series was the first *Zerstorer* to be widely produced. It featured the more powerful Daimler Benz 601A engines, which enabled it to fly faster and farther than earlier models, plus a shallower radiator, which eliminated a turbulence problem. The Bf 110C-4 version had extra armor protection for its crew of two, the pilot and rear gunner. It arrived in France just in time for the Battle of Britain.

Rate of Climb, Fighters



Messerschmitt Bf 110C-4/B *Jabo* Fighter/Bomber

In the summer of 1940, a modified version of the Bf 110C-4 began arriving at the Luftwaffe bases in France. This new model, the Bf 110C-4/B, had a pair of bomb racks beneath the fuselage and could carry two 551 pound bombs. It also featured the newer Daimler Benz 601N engines, which gave a slight boost in horsepower. A special Bf 110C-4/B unit, known as Experimental Group

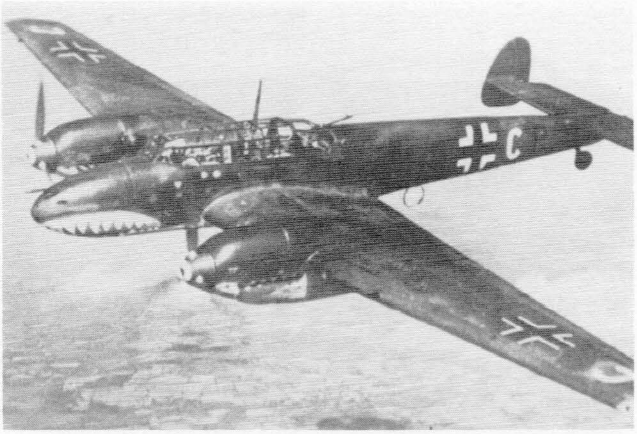
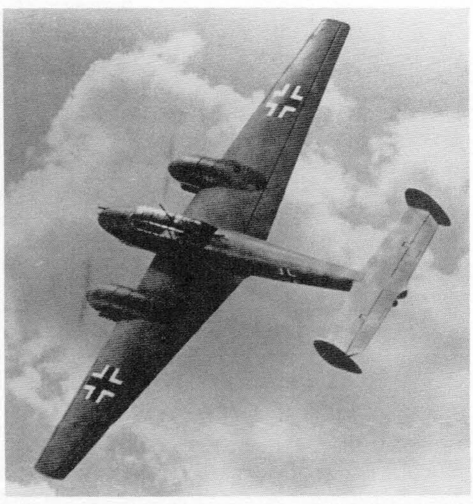
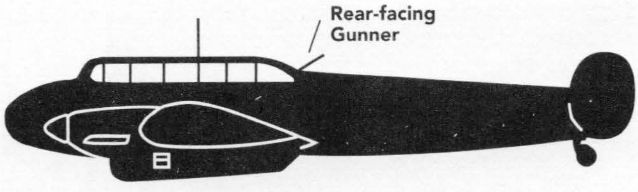


Photo courtesy of Aeroplane Photo Supply

210, was set up to develop fighter/bomber tactics, and in August this unit successfully attacked radar stations, airfields, and other targets in the south of Britain.

During the Battle of Britain the weaknesses of the Bf 110 began to outweigh its strengths. On the plus side it was almost as fast as the Spitfire, was formidably armed, a delight to fly, and extremely capable in the fighter/bomber role. When combating enemy fighters, Bf 110 pilots enjoyed the most success by diving down on enemy aircraft, blasting them with their superior firepower, and then flying away from the action. But in a dogfight the much larger Bf 110 was no match for the more maneuverable Spitfires and Hurricanes, and a great number of 110s were lost in the summer's fighting. Many Bf 110s were forced to fly in defensive circles, to protect each other's more vulnerable rear. As fighter escort for Luftwaffe bombers, Bf 110s fared so poorly that they themselves had to be escorted by Bf 109s, and were eventually removed from that role. The versatility of the Bf 110 did prove to be a vital asset for the Luftwaffe in later action in North Africa and on the Russian Front, where the fighter opposition was less intense.





Bf 110C-4 Performance
Powerplant: two Daimler Benz DB 601A 12-cylinder inline engines
Horsepower: 1,100 per engine
Top speed: 340 miles per hour
Rate of climb: 8.5 minutes to 18,000 feet
Ceiling: 32,810 feet
Range: 680 miles
Crew: two — one pilot and one rear gunner

Dimensions
Wingspan: 53 feet 4 inches
Wing area: 413 square feet
Length: 40 feet 4 inches
Height: 11 feet 6 inches

Weights
Empty: 9,920 pounds
Loaded: 15,290 pounds

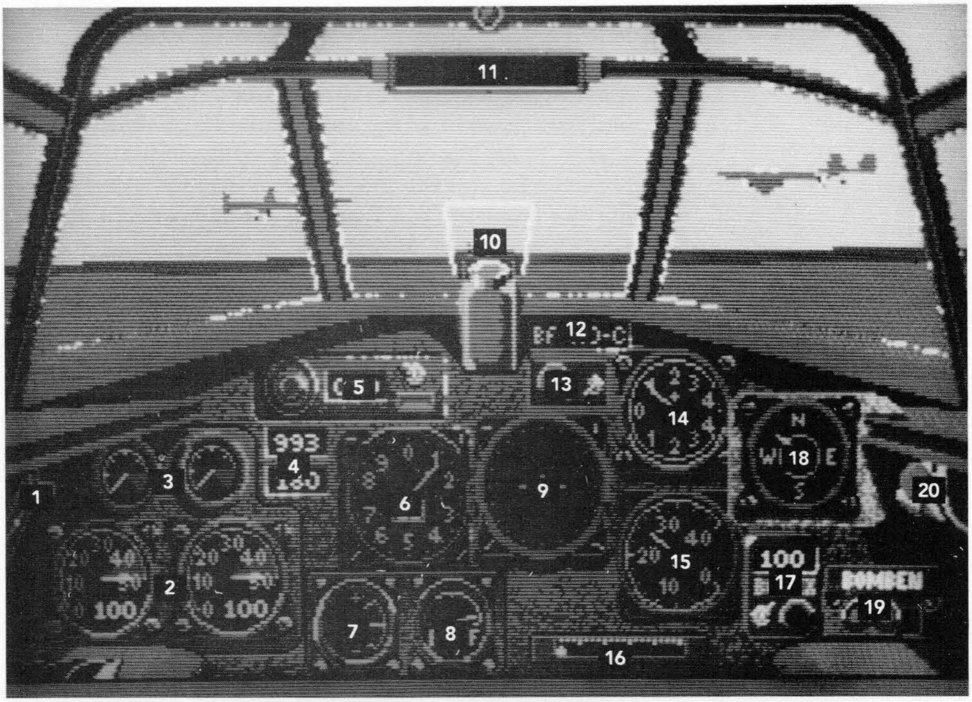
Armament
Guns: two 20 mm MG FF cannons with 180 rounds per gun, mounted in the nose. Four 7.92 mm MG 17 machine guns with 1,000 rounds per gun, also mounted in the nose. One flexible 7.92 mm MG 15 machine gun, mounted in the rear of the canopy.

Bf 110C-4/B Performance
Powerplant: two Daimler Benz DB 601N 12-cylinder liquid-cooled engines
Horsepower: 1,200 per engine
Top speed: 349 miles per hour
Rate of climb: 2,255 feet per minute
Ceiling: 32,800 feet
Range: 528 miles
Crew: two — one pilot and one rear gunner

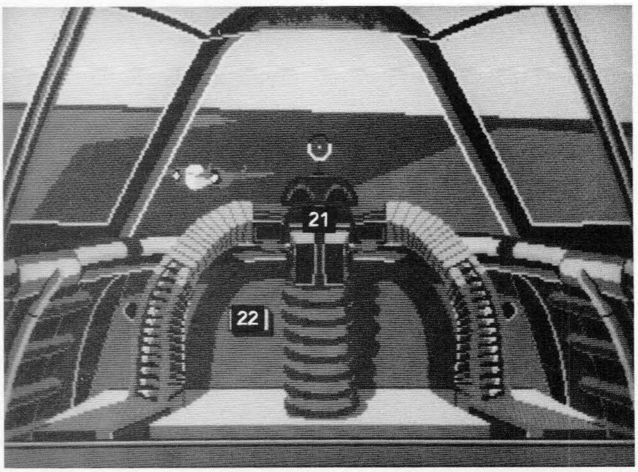
Dimensions
Wingspan: 53 feet 4 inches
Wing area: 413 square feet
Length: 40 feet 4 inches
Height: 11 feet 6 inches

Weights
Empty: 9,920 pounds
Loaded: 15,430 pounds

Armament:
Guns: two 20 mm MG FF cannons with 180 rounds per gun, mounted in the nose. Four 7.92 mm MG 17 machine guns with 1,000 rounds per gun, also mounted in the nose. One flexible 7.92 mm MG 15 machine gun, mounted in the rear of the canopy.
Warhead load: two 550 pound bombs, mounted beneath the fuselage



1. Flaps Lever
2. RPM Indicator
3. Engine Damage Indicators
4. Ammunition Round Indicators
5. Radio
6. Altimeter
7. Pitch Indicator
8. Fuel Gauge
9. Banking Indicator
10. Gunsight
11. View Indicator
12. Nameplate
13. Automatic Pilot Light
14. Climb/Dive Indicator
15. Airspeed Indicator
16. Airframe Damage Indicator
17. Replay Camera Indicator
18. Compass



19. Bomb Indicator Panel (Bf 110C-4/B *Jabo* fighter/bombers only)
20. Landing Gear Lever
21. Autoshoot Light
22. Ammunition Round Indicator

Above: Cockpit of a Bf 110
Below: View from the rear gun position

Junkers Ju 87B-1 Stuka Dive Bomber

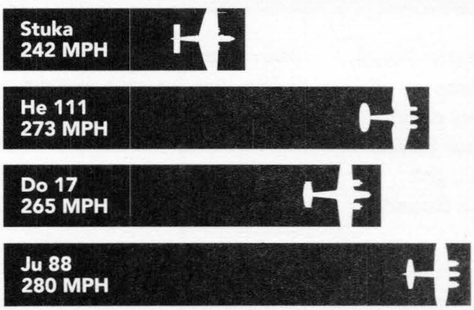
At the start of World War II the Junkers Ju 87 was the most feared weapon in the arsenal of the Luftwaffe — and perhaps even of the entire Third Reich. With its bent wings, fixed landing gear, and screaming sirens, the intimidating Stuka proved to be nearly unstoppable during the Spanish Civil War and the invasion of Poland. Since it could deliver bombs with great accuracy, it was



unsurpassed as an army-support weapon, despite its lack of speed and maneuverability. Coordinated attacks with Stukas and German Army troops, part of the tactics of the *Blitzkrieg*, were responsible for the incredible string of German successes during the early part of the war.

The Ju 87B-1 was the first model to be produced in great numbers, and it incorporated many of the lessons learned from Spanish Civil War combat. It featured a more powerful engine, redesigned landing struts, and better quarters for its crew of two, the pilot and the rear-facing gunner/radio operator. The Ju 87B-1 even had lines etched into the port side of the canopy showing diving angles, and an automatic pilot which pulled the plane out of its dive if the pilot blacked out. This was the model that gave the Stuka its notorious reputation, and it saw service in the campaigns against Poland, the Netherlands, Belgium, France, Greece, and Crete.

Top Speed, Bombers

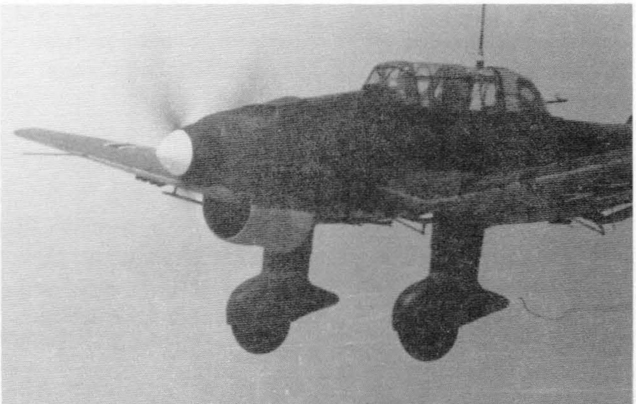


Junkers Ju 87B-2 Stuka Dive Bomber

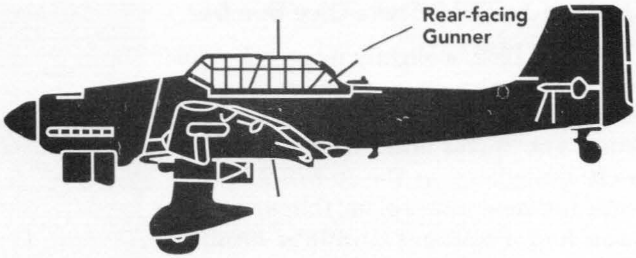


In late 1939, a slightly more powerful version of the Junkers Jumo 211 Da engine began to arrive at Ju 87 assembly lines. The Stukas fitted with this engine were designated as the Ju 87B-2. Along with the new powerplant this new version had a number of minor modifications, including a deeper radiator for better cooling, and adjustable-pitch wooden propeller blades to replace the thin metal ones on the B-1. Despite these changes, the performance of the B-2 differed little from that of the B-1.

The first Ju 87B-2s arrived in France just as the Battle of Britain began. At first B-1s and B-2s enjoyed success against British convoys in the English Channel. But after August 13, 1940, Eagle Day, Ju 87s were ordered to attack airfields and radar stations on the south coast of England, which were barely within the Stuka's range. For the first time in the war, the Ju 87 had to fly against significant enemy fighter opposition in an attack role for which it was ill-suited. The Ju 87's slow speed, lack of maneuverability, and poor crew protection proved fatal against RAF Spitfires and Hurricanes, especially when



pulling out of a dive, and over forty were shot down in just six days. Ju 87 losses mounted, and after August 19 the Stuka, its invincible reputation shattered, would see no more action in the Battle of Britain, though it would continue to be successful on other fronts.



Ju 87B-1 Performance
Powerplant: one Junkers Jumo 211 Da 12-cylinder Vee liquid-cooled engine
Horsepower: 1,200
Top speed: 242 miles per hour
Rate of climb: 12 minutes to 12,140 feet
Ceiling: 26,250 feet
Range: 373 miles
Crew: two — one pilot and one rear gunner

Dimensions
Wingspan: 45 feet 3 inches
Wing area: 344 square feet
Length: 36 feet 5 inches
Height: 12 feet 9 inches

Weights
Empty: 6,080 pounds
Loaded: 9,371 pounds

Armament
Guns: two 7.92 mm MG 17 machine guns with 1,000 rounds per gun, mounted in the wings. One flexible 7.92 mm MG 15 machine gun with 900 rounds, mounted at the rear of the canopy.
Warhead load: one 1,100 pound bomb, mounted beneath the fuselage. Four 110 pound bombs, mounted beneath the wings.

Ju 87B-2 Performance
Powerplant: one Junkers Jumo 211 Da 12-cylinder Vee liquid-cooled engine
Horsepower: 1,200
Top speed: 237 miles per hour
Rate of climb: 12 minutes to 12,140 feet
Ceiling: 26,250 feet
Range: 373 miles
Crew: two — one pilot and one rear gunner

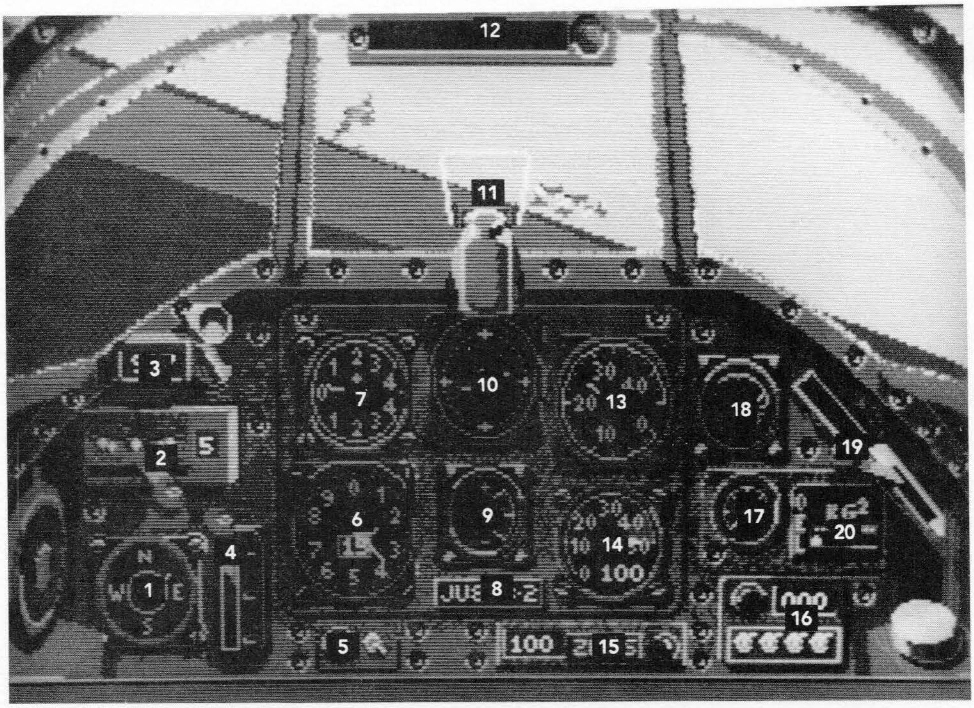
Dimensions
Wingspan: 45 feet 3 inches
Wing area: 344 square feet
Length: 36 feet 3 inches
Height: 13 feet 2 inches

Weights
Empty: 6,060 pounds
Loaded: 9,320 pounds

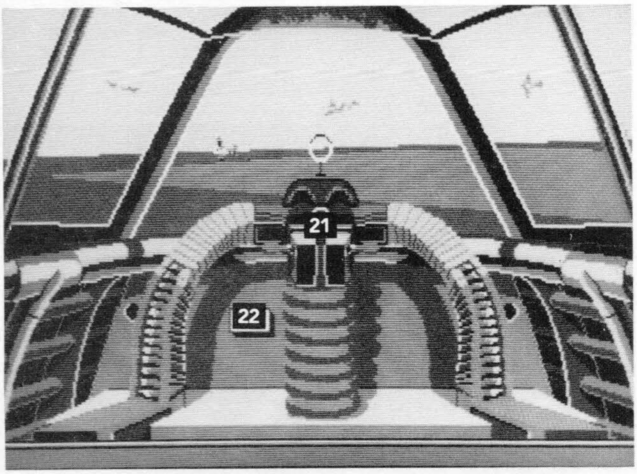
Armament
Guns: two 7.92 mm MG 17 machine guns, with 1,000 rounds per gun, mounted in the wings. One flexible 7.92 mm MG 15 machine gun with 900 rounds, mounted at the rear of the canopy.
Warhead load: one 1,100 pound bomb, mounted beneath the fuselage. Four 110 pound bombs, mounted beneath the wings.



The landing-gear mounted sirens, known as "trumpets of Jericho," emitted a banshee-like wail that was designed to strike terror into the hearts of those on the ground



1. Compass
2. Bomb Indicator Panel
3. Ammunition Round Indicator
4. Dive Brakes Lever
5. Automatic Pilot Light
6. Altimeter
7. Climb/Dive Indicator
8. Nameplate
9. Pitch Indicator
10. Banking Indicator
11. Gunsight
12. View Indicator
13. Airspeed Indicator
14. RPM Indicator
15. Replay Camera Indicator
16. Radio
17. Engine Damage Indicator
18. Fuel Gauge
19. Flaps Lever

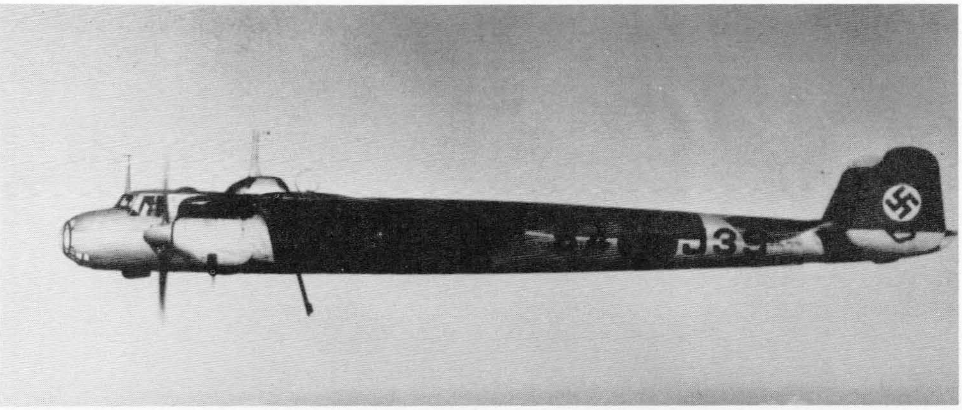


20. Airframe Damage Indicator
21. Autoshoot Light
22. Ammunition Round Indicator

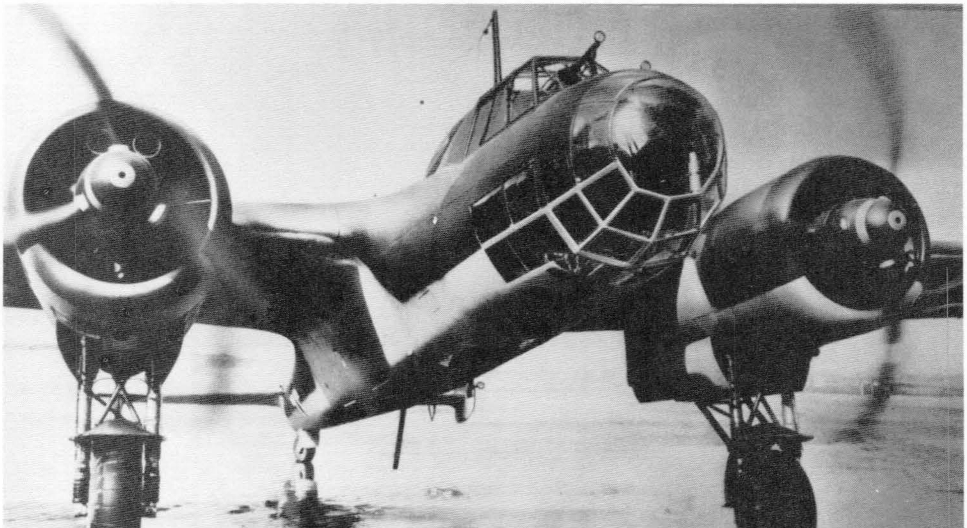
Above: Cockpit of a Ju 87 Stuka
Below: View from the rear gun position

Dornier Do 17z-2 Medium Bomber

Originally designed in 1934 as a passenger aircraft, the twin-engine "Flying Pencil" was rejected by the German airline Lufthansa because the slender fuselage did not leave enough room for its six passengers. The design



attracted the attention of the Luftwaffe, however, and prototypes were developed into bombers and reconnaissance planes that could fly faster than pursuing fighters. The feasibility of this *Schnellbomber* idea was tested at the Zurich Air Show in 1937, where a Do 17 prototype startled onlookers by finishing ahead of all the fighters in the competition.



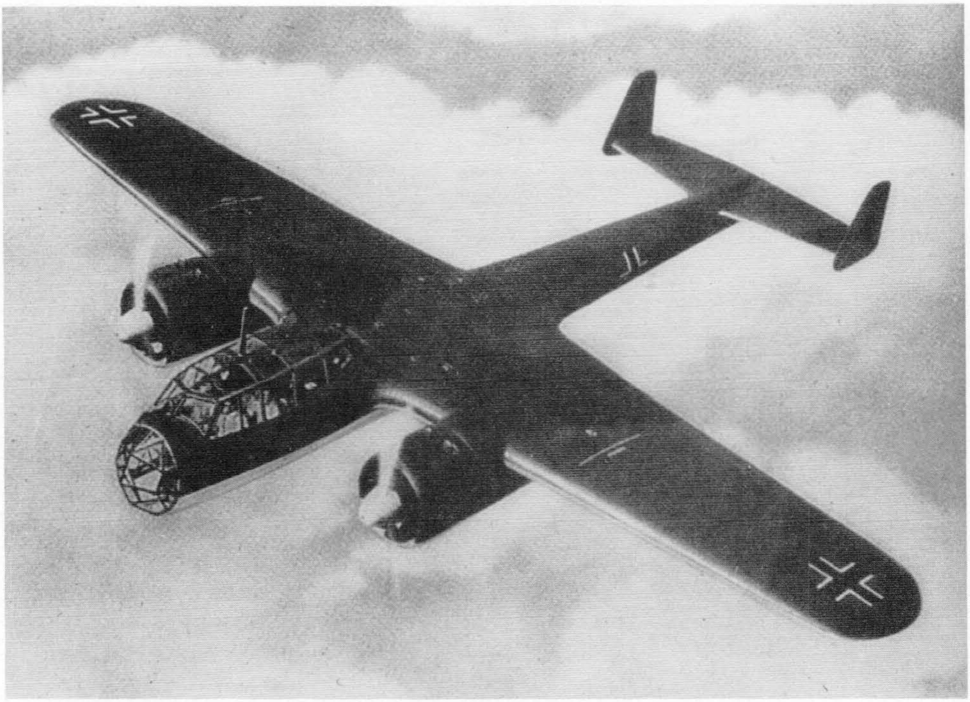
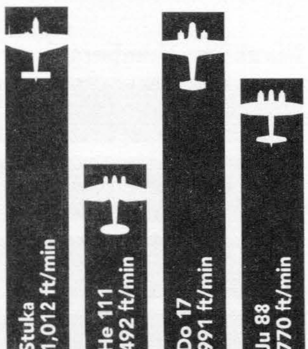
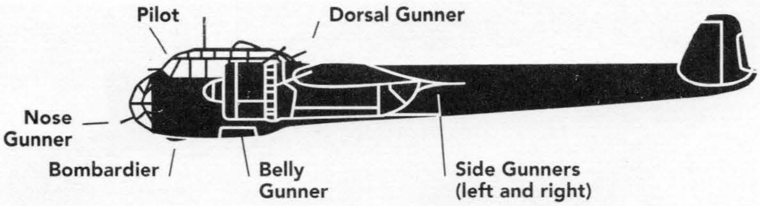


Photo courtesy of Aeroplane Temple Press, Ltd.

The first Do 17s saw service in the Spanish Civil War as reconnaissance aircraft. The Do 17z-2, which had extra protective armor, a redesigned nose, and a cockpit with more room and greater visibility, was delivered to the Luftwaffe in 1939. Unfortunately, the Messerschmitt factory had top priority and got to use the Daimler Benz engine for its Bf 109s, forcing the Do 17z-2 to use the less powerful BMW Bramo Fafnir engine, which greatly reduced its speed. During the Battle of Britain the Do 17z-2 was first used against Channel convoys, then on bombing missions against airfields and factories inland, where it did extensive damage despite suffering heavy losses. The Do 17 enjoyed success as a low-altitude bomber, since it could dive on a target with its engines at full throttle and then pick up enough speed to get away after dropping its bombload. Although it had several drawbacks, including a relatively light warhead load, the ruggedness, maneuverability, and stability of the Flying Pencil made it popular with the men who flew it.

Rate of Climb, Bombers





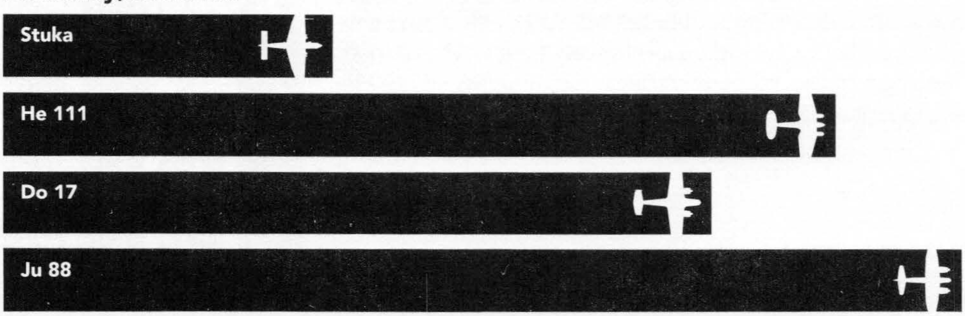
Do 17z-2 Performance
Powerplant: two BMW Bramo Fafnir 323P nine-cylinder air-cooled radial engines
Horsepower: 1,000 per engine
Top speed: 265 miles per hour
Rate of climb: 3.3 minutes to 3,280 feet
Ceiling: 26,740 feet
Range: 721 miles
Crew: four — one pilot, one radio operator, one flight engineer, and one aircraft commander/bombardier

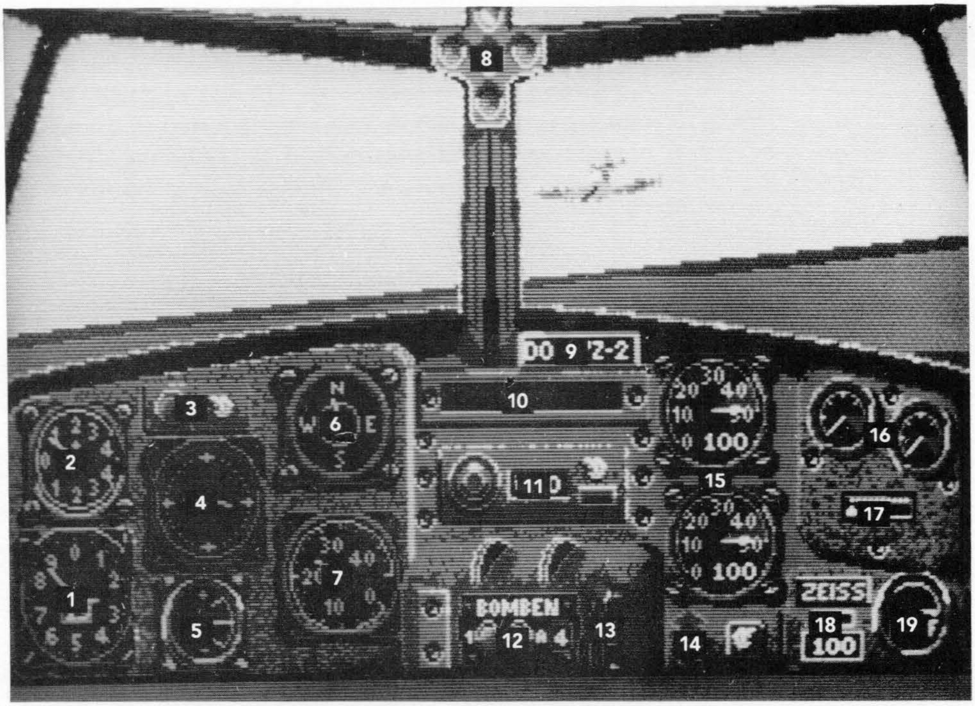
Dimensions
Wingspan: 59 feet 10 inches
Wing area: 592 square feet
Length: 51 feet 10 inches
Height: 15 feet

Weights
Empty: 11,484 pounds
Loaded: 18,913 pounds

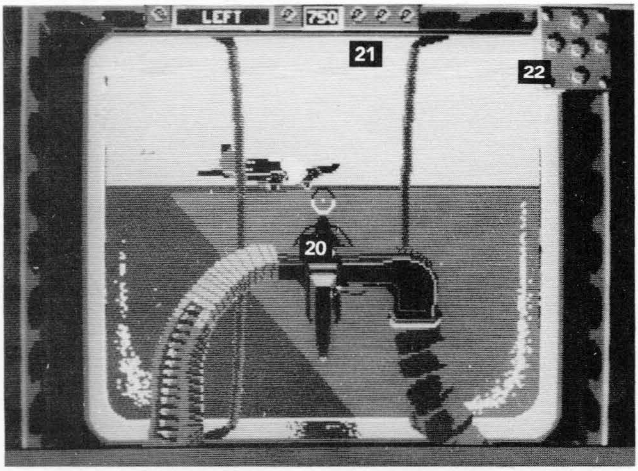
Armament
Guns: five 7.92 mm MG 15 machine guns with 750 rounds per gun — one mounted in the nose, one mounted at the upper part of the canopy facing rear, one mounted beneath the canopy facing rear, and two at the center of the fuselage facing left and right
Warhead load: four 550 pound bombs totaling 2,200 pounds

Durability, Bombers





1. Altimeter
2. Climb/Dive Indicator
3. Automatic Pilot Light
4. Banking Indicator
5. Pitch Indicator
6. Compass
7. Airspeed Indicator
8. Gun Indicator Lights
9. Nameplate
10. View Indicator
11. Radio
12. Bomb Indicator Panel
13. Flaps Lever
14. Landing Gear Indicator
15. RPM Indicators
16. Engine Damage Indicators
17. Airframe Damage Indicator
18. Replay Camera Indicator
19. Fuel Gauge

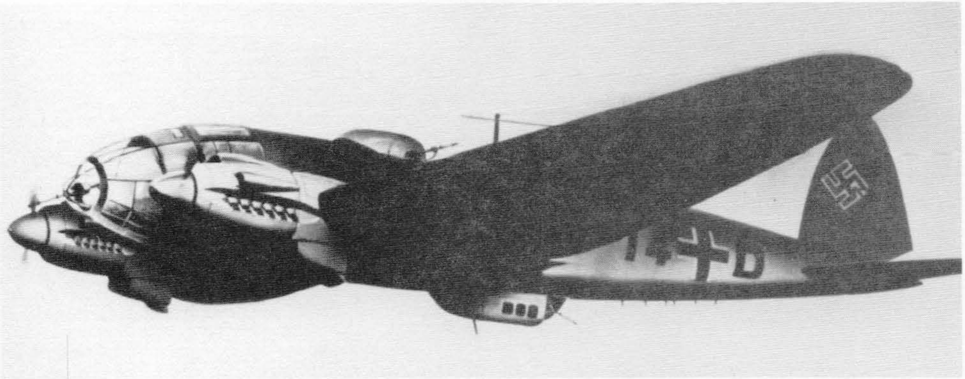


20. Autoshoot Light
21. Ammunition Round Indicator
22. Gun Indicator Lights

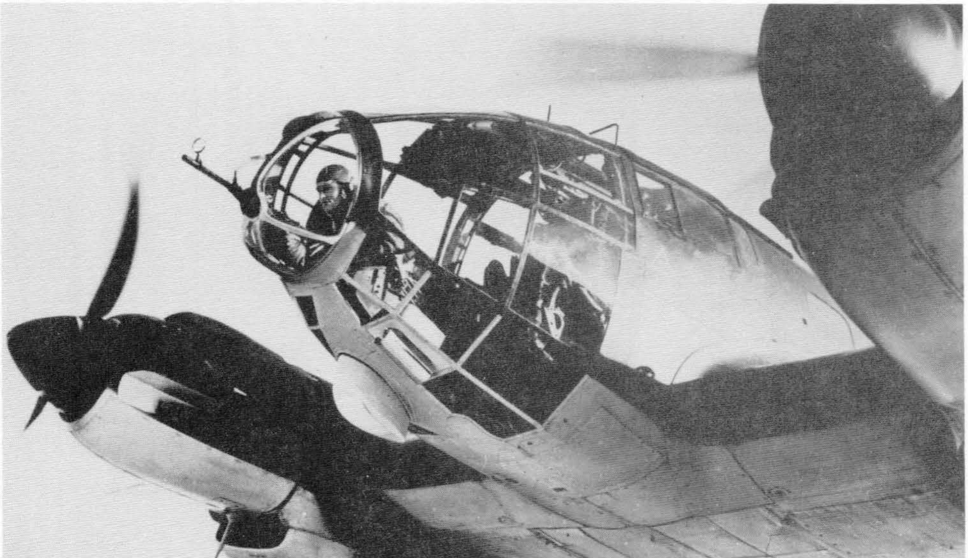
Above: Cockpit of a Do 17
Below: View from the left fuselage gun position

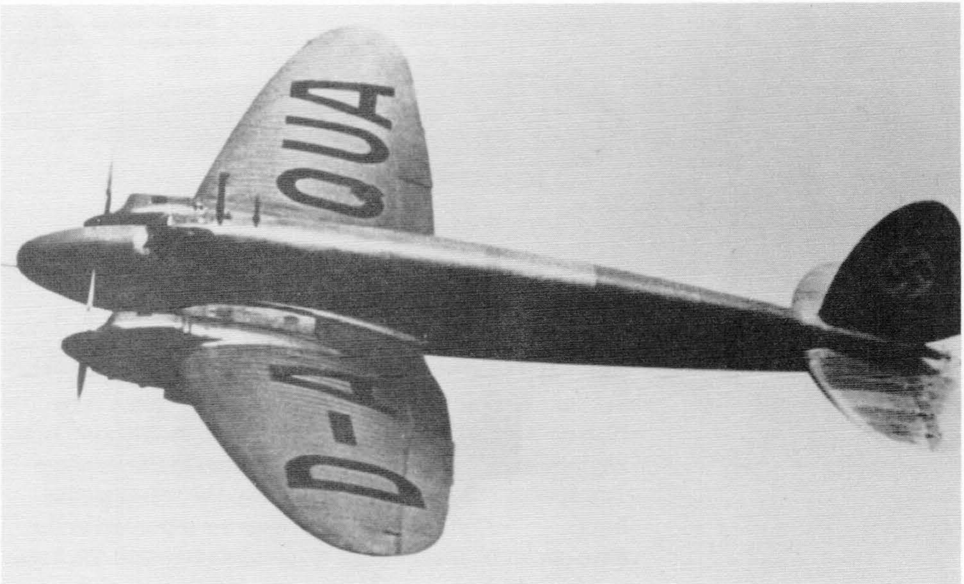
Heinkel He 111H-3 Medium Bomber

The bomber used most by the Luftwaffe in the Battle of Britain, the twin-engine He 111 was originally introduced as a civil airliner but secretly tested as a bomber. In fact early versions, marked as Lufthansa airliners, actually flew photo reconnaissance missions over



Britain, France, and the Soviet Union in 1937. The He 111 was first used in the Spanish Civil War with a great deal of success, as it flew faster than the defending fighters. Then in 1939 it was mass produced as the main Luftwaffe bomber. Called "The Spade" by its crews because of its broad, rounded wings, the glass-nosed He 111 saw

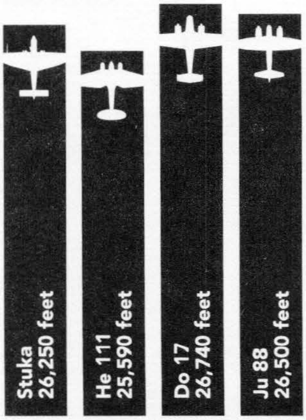


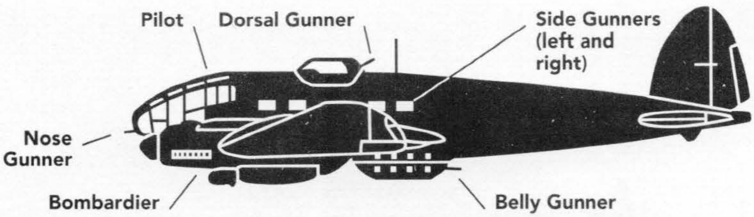


service in campaigns against Poland, Belgium, the Netherlands, and France.

The He 111H-3 could carry twice the bombload of a Do 17, and over a thousand pounds more than the Ju 88. But since the Messerschmitt factory was using all available Daimler Benz engines, the He 111H-3, like the Do 17, was forced to use less powerful engines that reduced its airspeed. To compensate for its slowness, more machine guns were added, along with extra armor protection. He 111H-3s did extensive damage to British targets during the Battle of Britain, when protected by fighter escort, and gained a reputation as a tough aircraft capable of remaining airborne even when shot to pieces. But when fighter protection was unavailable, the lumbering "Spade" was shot down in great numbers by the much faster British fighters. After the Battle, however, He 111s were the main Luftwaffe bombers used in the Blitz, and nearly leveled London.

Ceiling, Bombers



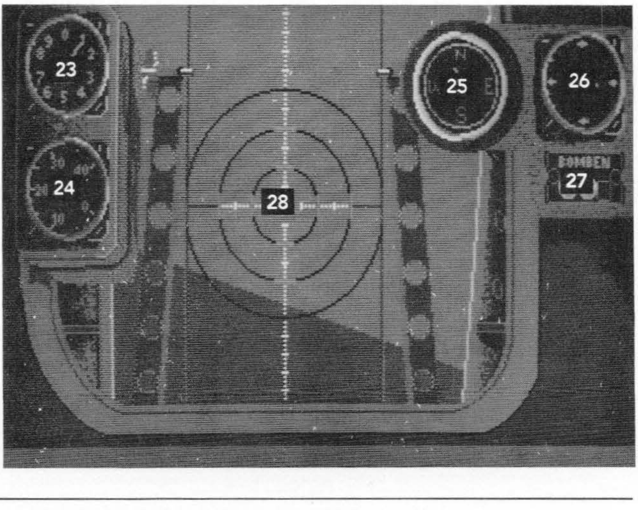


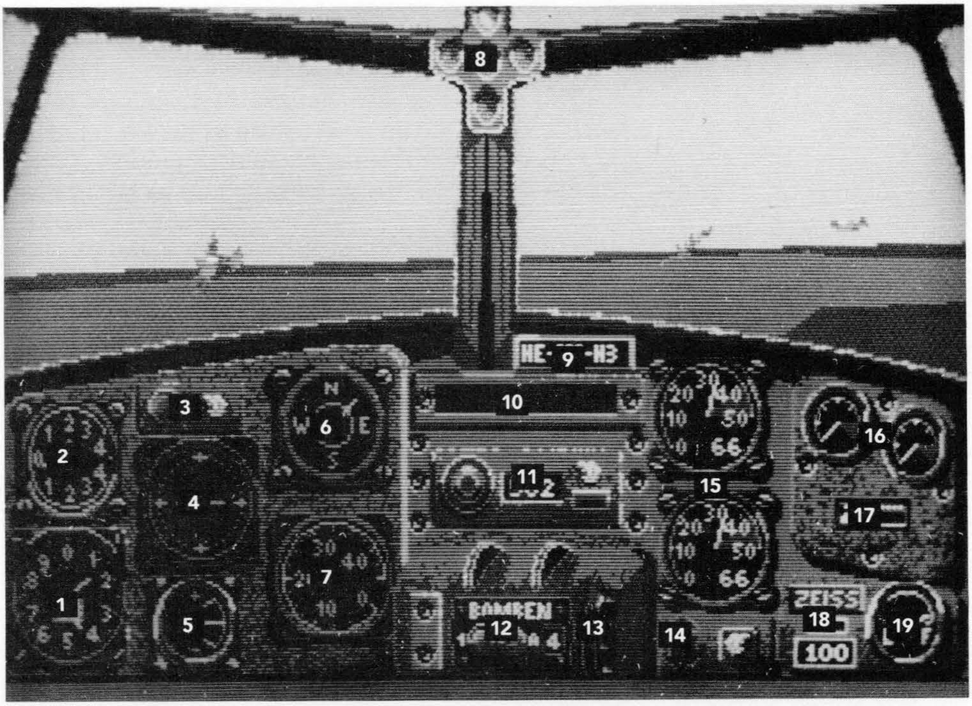
He 111H-3 Performance
Powerplant: two Junkers Jumo 211D-2 12-cylinder Vee liquid-cooled engines
Horsepower: 1,200 per engine
Top speed: 273 miles per hour
Rate of climb: 30 minutes to 14,765 feet
Ceiling: 25,590 feet
Range: 745 miles
Crew: four or five

Dimensions
Wingspan: 74 feet 2 inches
Wing area: 943 square feet
Length: 53 feet 9 inches
Height: 13 feet 2 inches

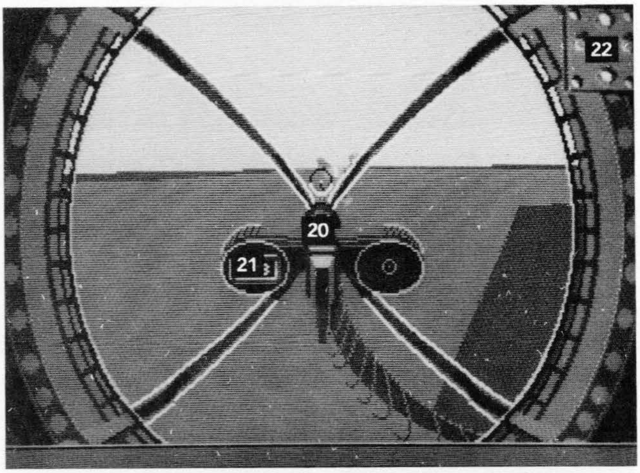
Weights
Empty: 15,873 pounds
Loaded: 28,924 pounds

Armament
Guns: five 7.92 mm MG 15 machine guns with 750 rounds per gun — one mounted in the nose, one mounted in the fuselage above the wings facing rear, one mounted in the gondola beneath the fuselage facing rear, and two mounted at the waist windows at the center of the fuselage
Warhead load: eight 550 pound bombs or four 1,100 pound bombs, totaling 4,400 pounds





1. Altimeter
2. Climb/Dive Indicator
3. Automatic Pilot Light
4. Banking Indicator
5. Pitch Indicator
6. Compass
7. Airspeed Indicator
8. Gun Indicator Lights
9. Nameplate
10. View Indicator
11. Radio
12. Bomb Indicator Panel
13. Flaps Lever
14. Landing Gear Indicator
15. RPM Indicators
16. Engine Damage Indicators
17. Airframe Damage Indicator
18. Replay Camera Indicator
19. Fuel Gauge
20. Autoshoot Light
21. Ammunition Round Indicator



22. Gun Indicator Lights
23. Altimeter
24. Airspeed Indicator
25. Compass
26. Banking Indicator
27. Bomb Indicator Panel
28. Bombsight

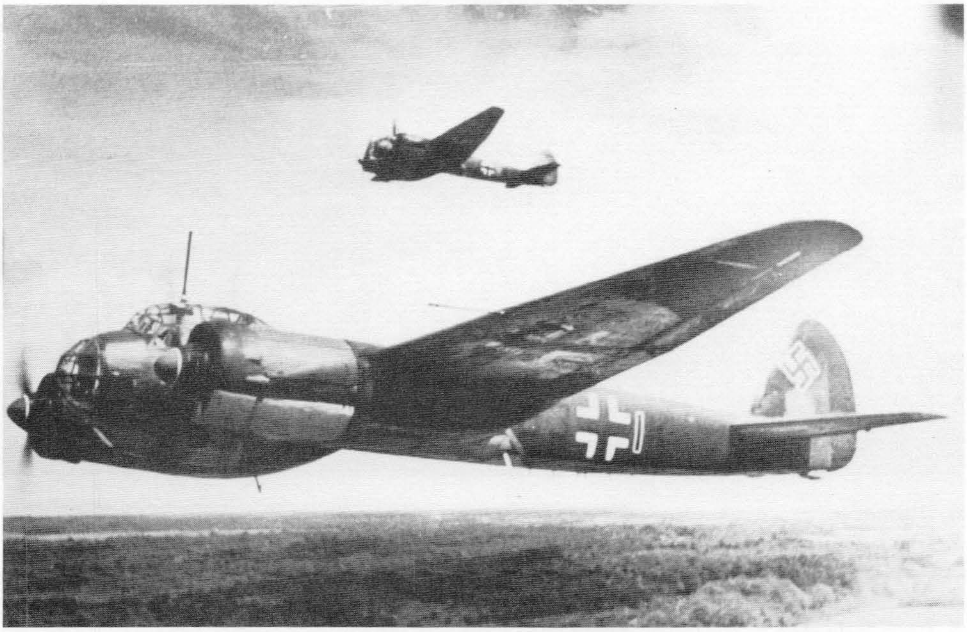
Above: Cockpit of an He 111

Below: View from the nose gunner position

Left: Bombardier position on a medium bomber

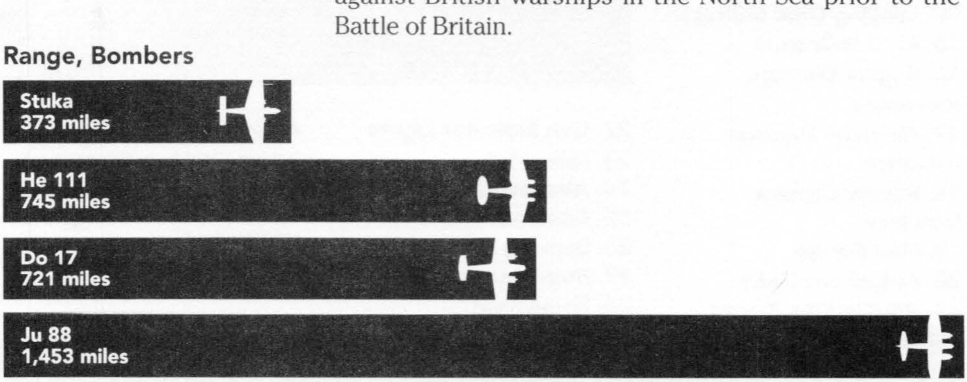
Junkers Ju 88A-1 Medium Bomber/Dive Bomber

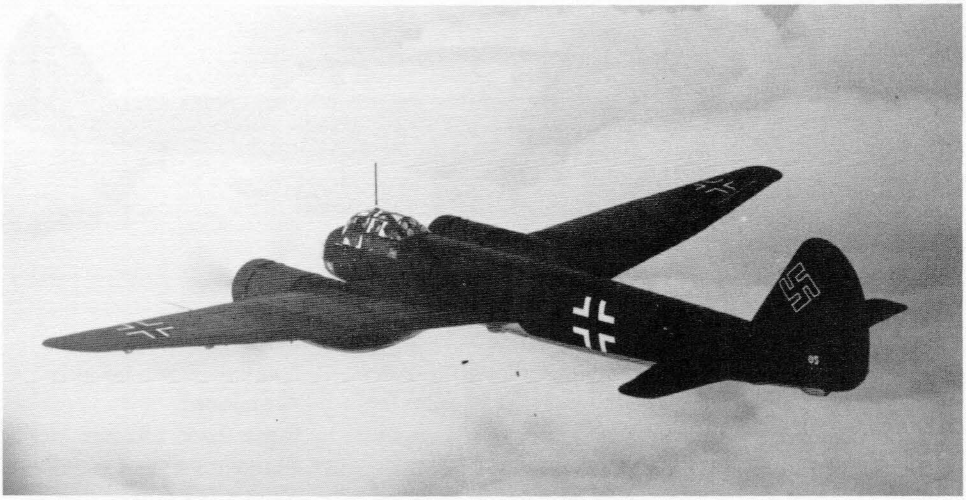
The newest and best of the German medium bombers in 1940, the twin-engine Junkers Ju 88 did not see as much action in the Battle of Britain as the He 111 or the Do 17 because fewer of them had been produced. Swift, reliable, and tough, the Ju 88 ended up as the primary



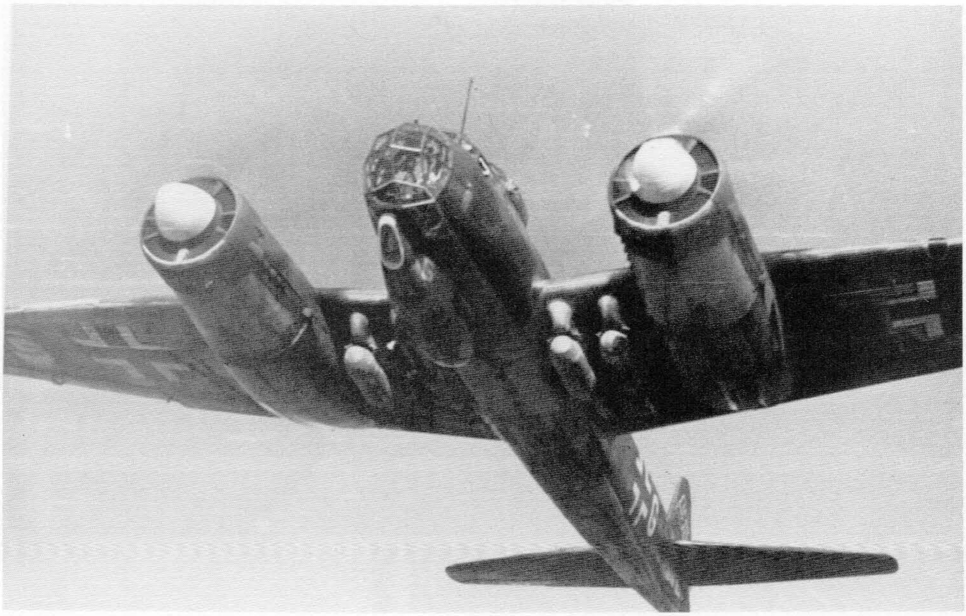
all-purpose bomber of the Luftwaffe, and nearly fifteen thousand were built during the course of World War II. Based on a 1935 design by a team led by two Americans, the first prototype flew in December 1936. Limited production began in 1939, too late for the testing grounds of the Spanish Civil War, and it saw little action in the conquest of Europe. The Ju 88 was used on a limited basis against British warships in the North Sea prior to the Battle of Britain.

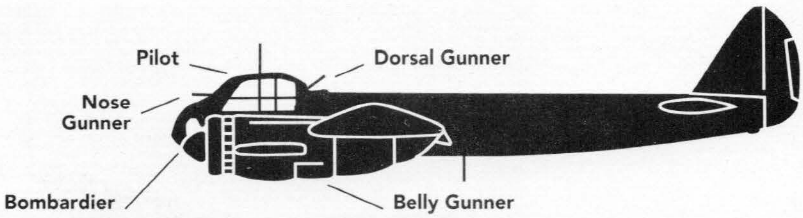
Range, Bombers





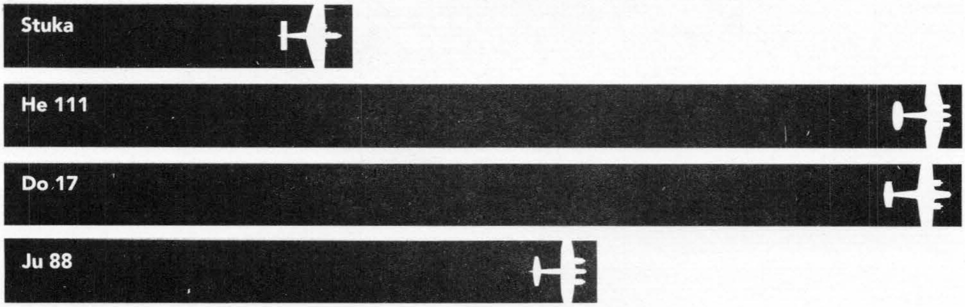
The Ju 88A-1 was the first of these models to be widely produced, and featured underwing dive brakes that enabled it to be used as a dive bomber. It was faster, stronger, more maneuverable, and could fly farther than any other Luftwaffe medium bomber. In the Battle of Britain, the Ju 88A-1 initially enjoyed success attacking RAF airfields. But as the Battle progressed, the Ju 88A-1, like the other Luftwaffe bombers, proved vulnerable to the RAF fighters, though crews had a better chance of getting back to their bases in this excellent aircraft than in the others.

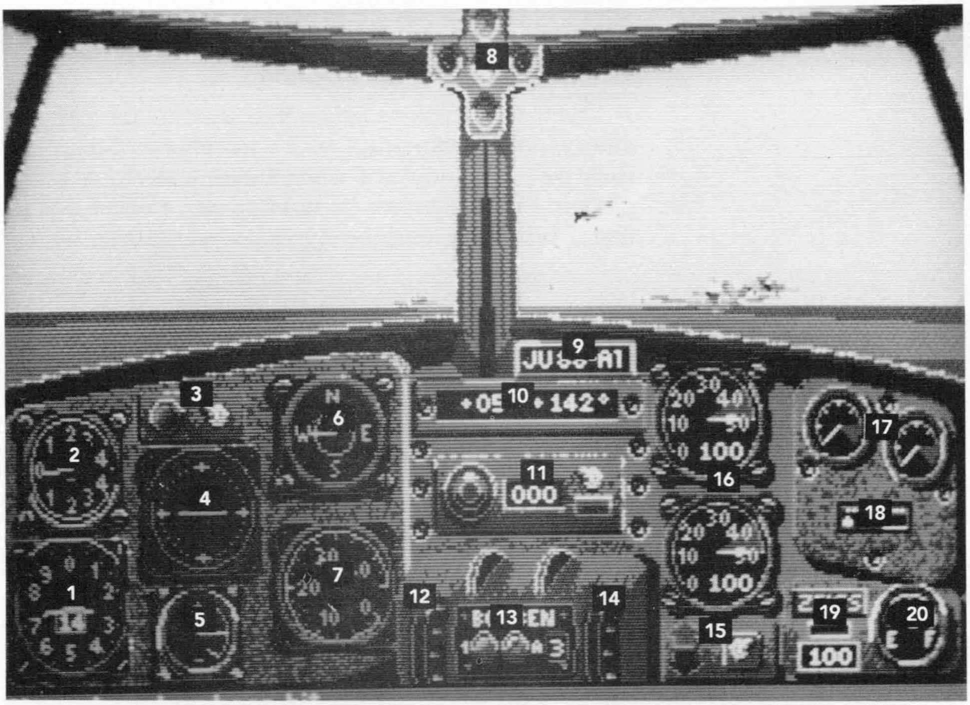




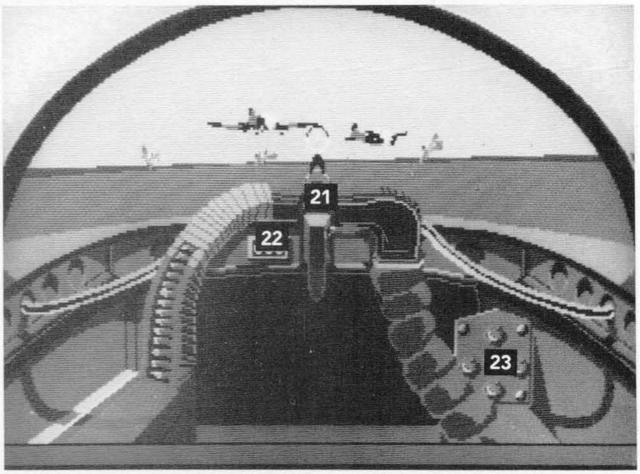
Ju 88A-1
Performance
Powerplant: two Junkers Jumo 211B-1 12-cylinder Vee liquid-cooled engines
Horsepower: 1,200 per engine
Top speed: 280 miles per hour
Rate of climb: 23 minutes to 17,715 feet
Ceiling: 26,500 feet
Range: 1,453 miles
Crew: four — one pilot, one bombardier/nose gunner, one radio operator/rear gunner, and one gondola gunner
Dimensions
Wingspan: 59 feet 10 inches
Wing area: 540 square feet
Length: 47 feet 1 inch
Height: 15 feet 5 inches
Weights
Empty: 21,738 pounds
Loaded: 30,865 pounds
Armament
Guns: three 7.92 mm MG 15 machine guns with 750 rounds per gun — one mounted in the nose, one mounted on the top of the fuselage above the wings facing rear, and one mounted in the gondola beneath the fuselage facing rear
Warhead load: six 550 pound bombs or three 1,100 pound bombs, totaling 3,300 pounds, mounted beneath the fuselage

Firepower, Bombers





1. Altimeter
2. Climb/Dive Indicator
3. Automatic Pilot Light
4. Banking Indicator
5. Pitch Indicator
6. Compass
7. Airspeed Indicator
8. Gun Indicator Lights
9. Nameplate
10. View Indicator
11. Radio
12. Dive Brakes Lever
13. Bomb Indicator Panel
14. Flaps Lever
15. Landing Gear Indicator
16. RPM Indicators
17. Engine Damage Indicators
18. Airframe Damage Indicator
19. Replay Camera Indicator
20. Fuel Gauge



21. Autoshoot Light
22. Ammunition Round Indicator
23. Gun Indicator Lights

Above: Cockpit of a Ju 88
Below: View from the upper dorsal gun position

Hawker Hurricane Mk I Fighter

The first monoplane fighter ever used by the RAF, the sturdy, reliable Hurricane was a workhorse during the early part of World War II when it outnumbered all other modern British fighters. Its fuselage was constructed of metal tubes surrounded by wood and fabric, which



enabled it to sustain a good deal of damage in battle and to be quickly repaired on the ground. Although not as fast or as maneuverable as the German Bf 109, the performance of the Hurricane was nevertheless close enough to hold its own in dogfights if its pilot was skilled enough. Also, since it had better range, it had the advantage of staying in the air longer than the Bf 109. The rugged, heavily-armored Hurricane proved to be devas-

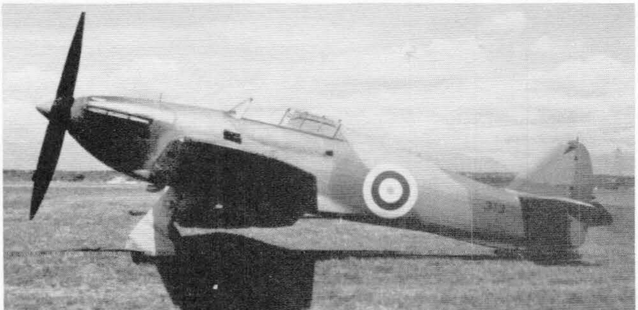


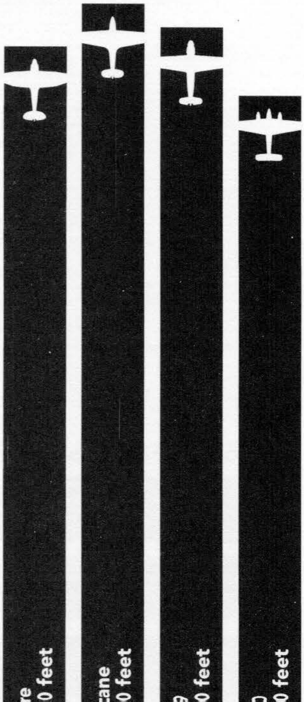


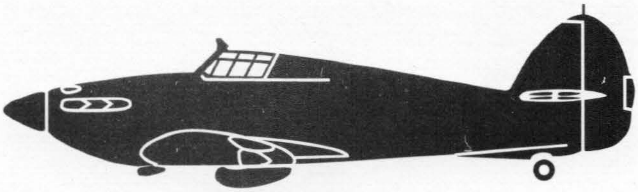
Photo courtesy of and copyright Flight Magazine

tating against the other German aircraft. Frequently British fighter tactics called for this fighter to attack the bombers, while the more maneuverable Spitfire would take on the 109s. The Hurricane proved more than capable, and 57 percent of the German aircraft lost in the Battle of Britain were shot down by Hurricanes.

The Hurricane Mk I was the first production model to go into service. Later versions of this model featured an all-metal wing, replacing the earlier fabric-skinned wing, plus extra armor protection around the cockpit area. These were used in the defense of Singapore against the Japanese, and in the Battle of France and the Battle of Britain.

Ceiling, Fighters





Hurricane Mk I

Performance

Powerplant: one Rolls Royce Merlin II or III 12-cylinder liquid-cooled engine
Horsepower: 1,030
Top speed: 320 miles per hour
Rate of climb: 2,420 feet per minute
Ceiling: 35,000 feet
Range: 460 miles
Crew: one

Dimensions

Wingspan: 40 feet
Wing area: 257 square feet
Length: 31 feet 5 inches
Height: 13 feet 1 inch

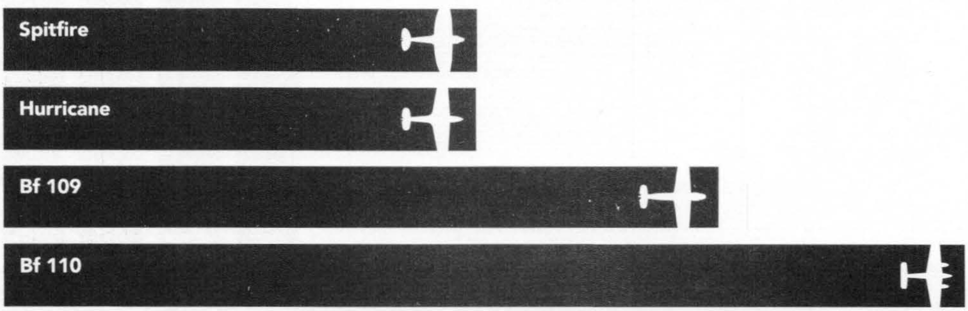
Weights

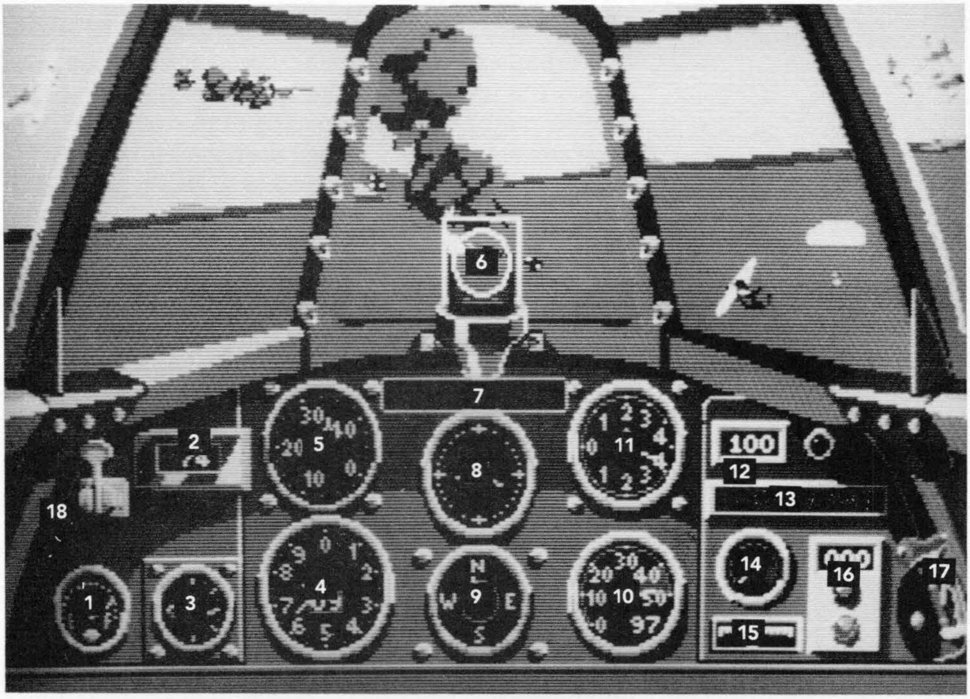
Empty: 4,670 pounds
Loaded: 6,600 pounds

Armament

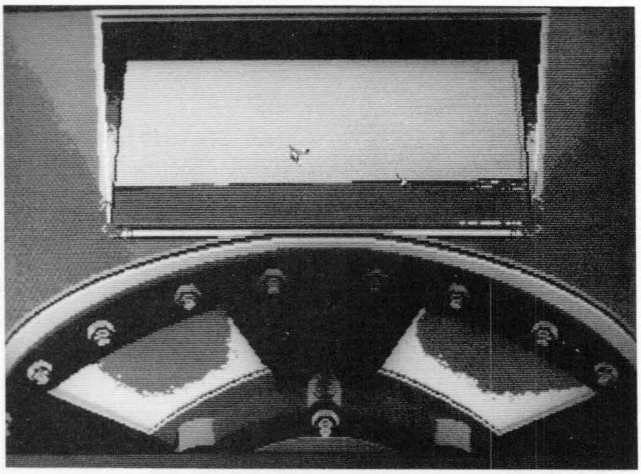
Guns: eight Browning .303 caliber machine guns, four mounted in each wing, with 334 rounds per gun

Firepower, Fighters





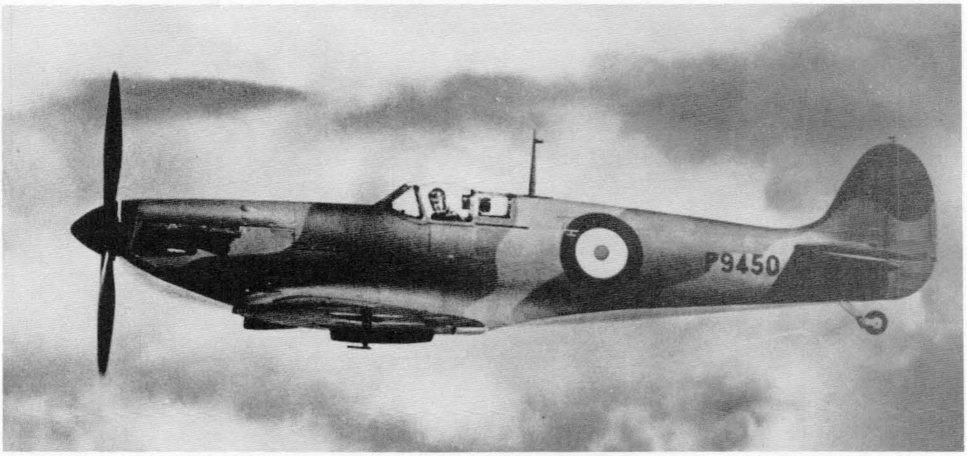
1. Fuel Gauge
2. Ammunition Round Indicator
3. Pitch Indicator
4. Altimeter
5. Airspeed Indicator
6. Gunsight
7. View Indicator
8. Banking Indicator
9. Compass
10. RPM Indicator
11. Climb/Dive Indicator
12. Replay Camera Indicator
13. Nameplate
14. Engine Damage Indicator
15. Airframe Damage Indicator
16. Radio
17. Landing Gear Lever
18. Flaps Lever



Above: Cockpit of a Hurricane
Below: View from the rear view mirror

Supermarine Spitfire Mk I Fighter

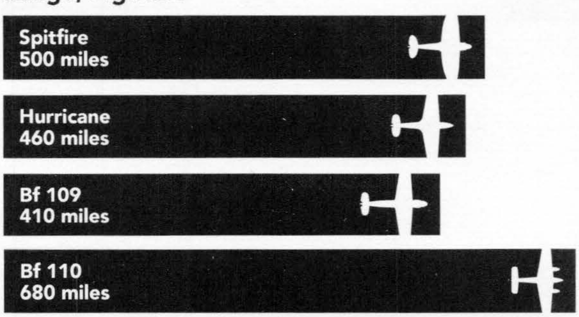
Perhaps no other combat aircraft in history can match the reputation of the Spitfire. In the eyes of the British public, the performance of this aircraft, more than any other factor, decided the outcome of the Battle of Britain and changed the course of World War II. The first all-metal fighter to be produced for the RAF, the Spitfire was noted for its sleek design and unique thin, oval wings. While the Hurricane evolved from a biplane design, the Spitfire was designed as a monoplane from the start. And while the Hurricane outnumbered the



Spitfire in 1940 and shot down more German aircraft, the Spitfire captured the imagination of the British people.

Originally based on a design for a record-breaking racing seaplane, the first Spitfire prototype flew in 1936. Though its complex design delayed initial production, the first Spitfires, model Mk I, were delivered to RAF squadrons in 1938. The first seventy-seven aircraft had two-blade fixed pitch propellers, and succeeding aircraft were fit with three-blade two position propellers, thereby raising its ceiling by 7,000 feet and improving climbing and diving. Later modifications included the addition of a high-visibility bubble cockpit hood and extra armor protection. The Spitfire Mk I first saw action in October 1939 at the Firth of Forth in Scotland, where two RAF squadrons intercepted Ju 88 bombers and shot one down.

Range, Fighters



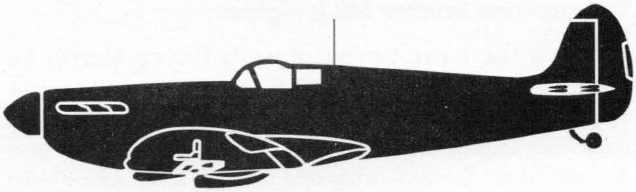
Supermarine Spitfire Mk II Fighter

When the more powerful Rolls Royce Merlin XII engine was developed in 1940, it was delivered to a new Spitfire plant near Birmingham. The Spitfire model that used this engine was known as the Mk II, and the first one rolled off the assembly line in June 1940. Along with a higher level of performance, the Spitfire Mk II was more combat-worthy than the Mk I, with self-sealing fuel tanks, a bullet-proof windshield, and extra armor protection for the pilot added during assembly. Certain versions of this model could also carry bombs and extra fuel tanks.



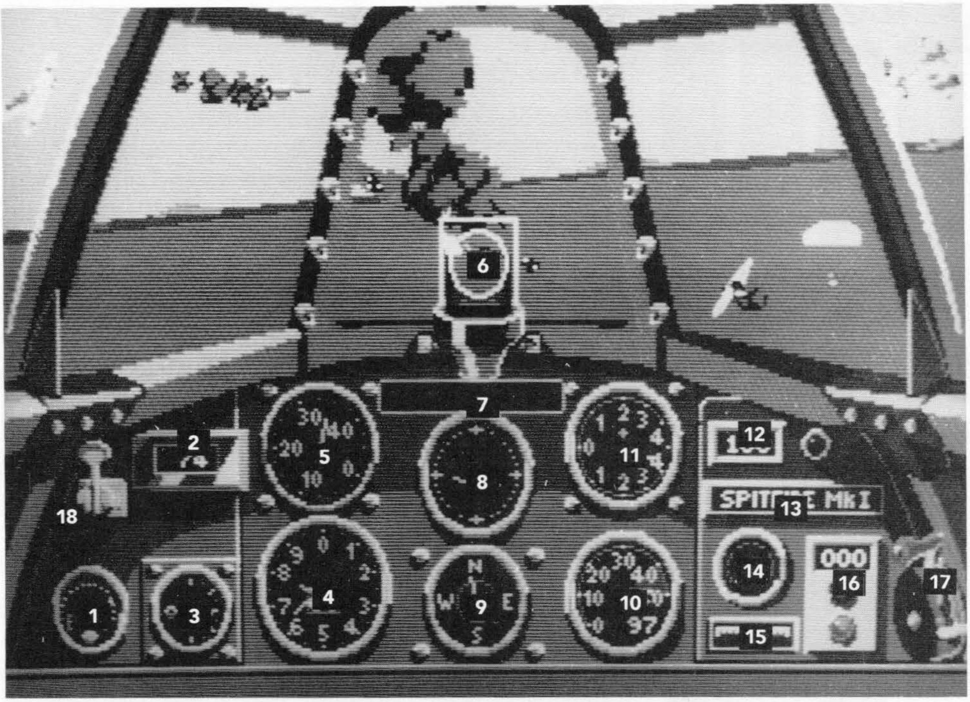
During the Battle of Britain, the speed and maneuverability of the Spitfire made it an even match for its main German adversary, the Bf 109, and gave it a decisive advantage over other German aircraft. Although the Spitfire could not outclimb the Bf 109, it could outrun it, unlike the Hurricane. The Spitfire's engine, however, would sometimes cut out in combat when the G-forces caused fuel to flood the carburetor. To prevent Bf 109 pilots from taking advantage of this, British pilots would execute a half roll and dive, which kept the Spitfire's engine running. The carburetion flaw was later corrected, and the Spitfire would go down in history as perhaps the best defensive weapon of the war.





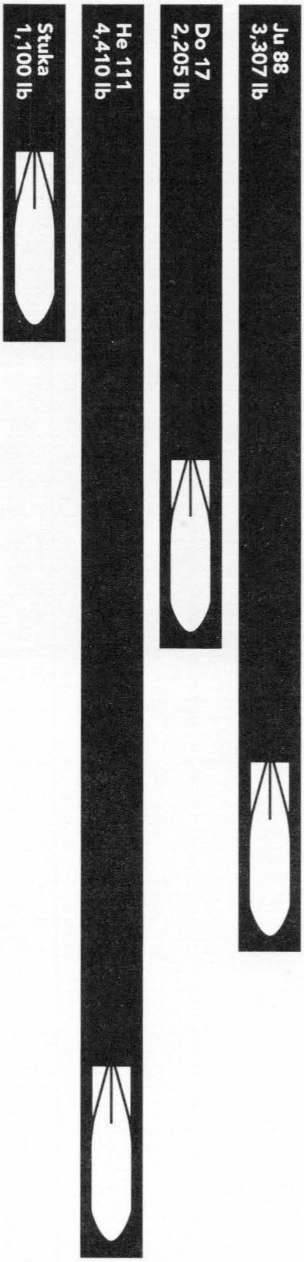
Spitfire Mk I
Performance
Powerplant: one Rolls Royce Merlin II or III 12-cylinder liquid-cooled engine
Horsepower: 1,030
Top speed: 355 miles per hour
Rate of climb: 2,530 feet per minute
Ceiling: 34,000 feet
Range: 395 miles
Crew: one
Dimensions
Wingspan: 36 feet 10 inches
Wing area: 242 square feet
Length: 29 feet 11 inches
Height: 11 feet 5 inches
Weights
Empty: 5,067 pounds
Loaded: 6,409 pounds
Armament
Guns: eight Browning .303 caliber machine guns, four mounted in each wing, with 300 rounds per gun

Spitfire Mk II
Performance
Powerplant: one Rolls Royce Merlin XII 12-cylinder liquid-cooled engine
Horsepower: 1,175
Top speed: 370 miles per hour
Rate of climb: 2,600 feet per minute
Ceiling: 34,000 feet
Range: 500 miles
Crew: one
Dimensions
Wingspan: 36 feet 10 inches
Wing area: 242 square feet
Length: 29 feet 11 inches
Height: 11 feet 5 inches
Weights
Empty: 5,142 pounds
Loaded: 6,484 pounds
Armament
Guns: eight Browning .303 caliber machine guns, four mounted in each wing, with 300 rounds per gun



1. Fuel Gauge
2. Ammunition Round Indicator
3. Pitch Indicator
4. Altimeter
5. Airspeed Indicator
6. Gunsight
7. View Indicator
8. Banking Indicator
9. Compass
10. RPM Indicator
11. Climb/Dive Indicator
12. Replay Camera Indicator
13. Nameplate
14. Engine Damage Indicator
15. Airframe Damage Indicator
16. Radio
17. Landing Gear Lever

Bombload, Bombers



GERMAN AIRBORNE WEAPONS

7.92 mm MG 15 and MG 17 Machine Guns

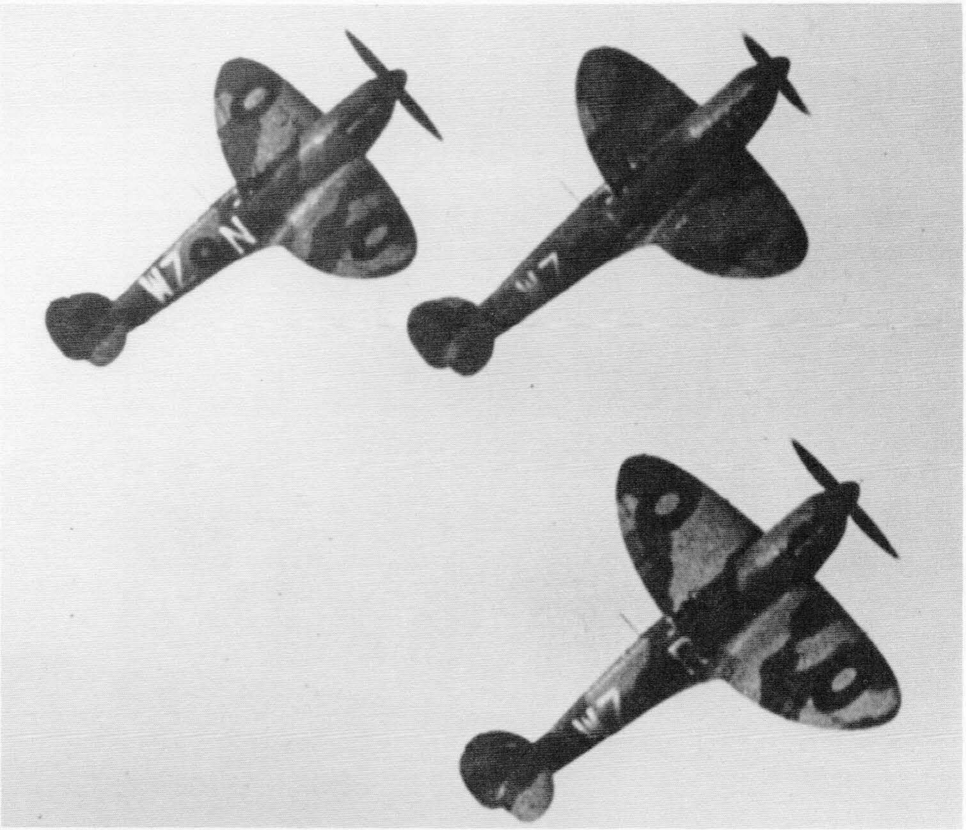
The MG 15 and MG 17 were the standard German airborne machine guns, used by both Luftwaffe fighters and bombers. The MG 17 was mounted on the wings, fuselage, and nose of the Bf 109, the Bf 110, and the Ju 87. The MG 15 was drum-fed, and flexibly-mounted inside the canopies and gondolas of the He 111, the Do 17, and the Ju 88. In performance, these weapons had a slightly slower rate of fire than the British .303 machine guns, although they fired slightly heavier bullets.

20 mm MG FF and MG FF/M Cannons

The MG FF and MG FF/M cannons could do a great deal of damage at close range, especially the MG FF/M, which had a higher firing rate. Mounted in the wings of the Bf 109 and in the nose of the Bf 110, they fired a thin-shelled projectile that exploded on impact. These cannons, however, had a limited magazine of sixty shells, which could be used up in just eight seconds! Worse yet, they had a low muzzle velocity, meaning that the shells were slow to reach the target. Since it was hard for Luftwaffe pilots and gunners to keep the swift RAF fighters in their gunsights for long, this proved to be a great drawback.

1,100/550/110 Pound (500/250/50 kg) Bombs

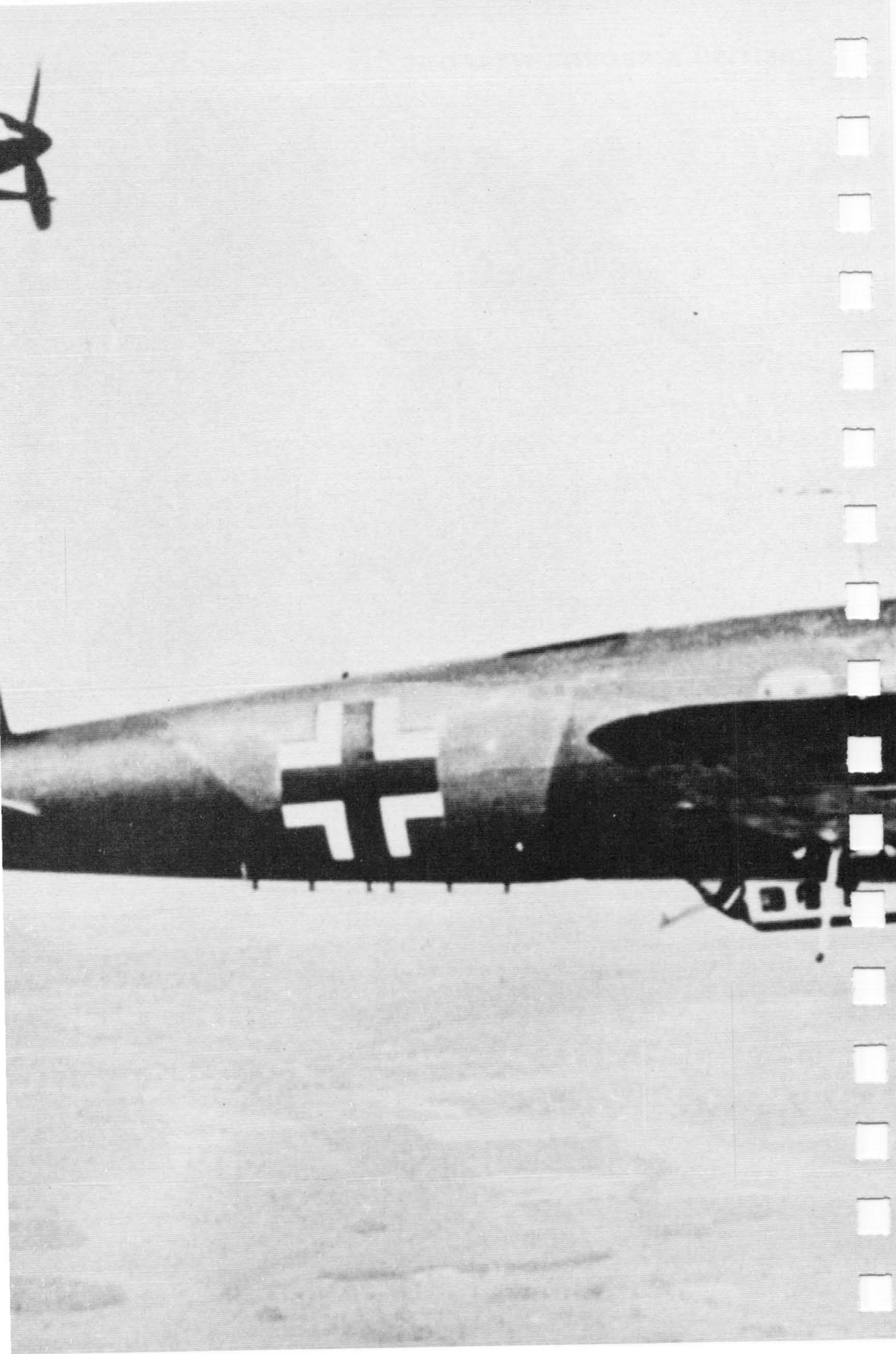
The 1,100, 550, and 110 pound bombs were general-purpose bombs, with bodies made of a solid piece of forged steel, then packed with explosives. From the He 111, the 550 pound version was dropped tail-first, which the British and other Allied enemies claimed reduced its accuracy.



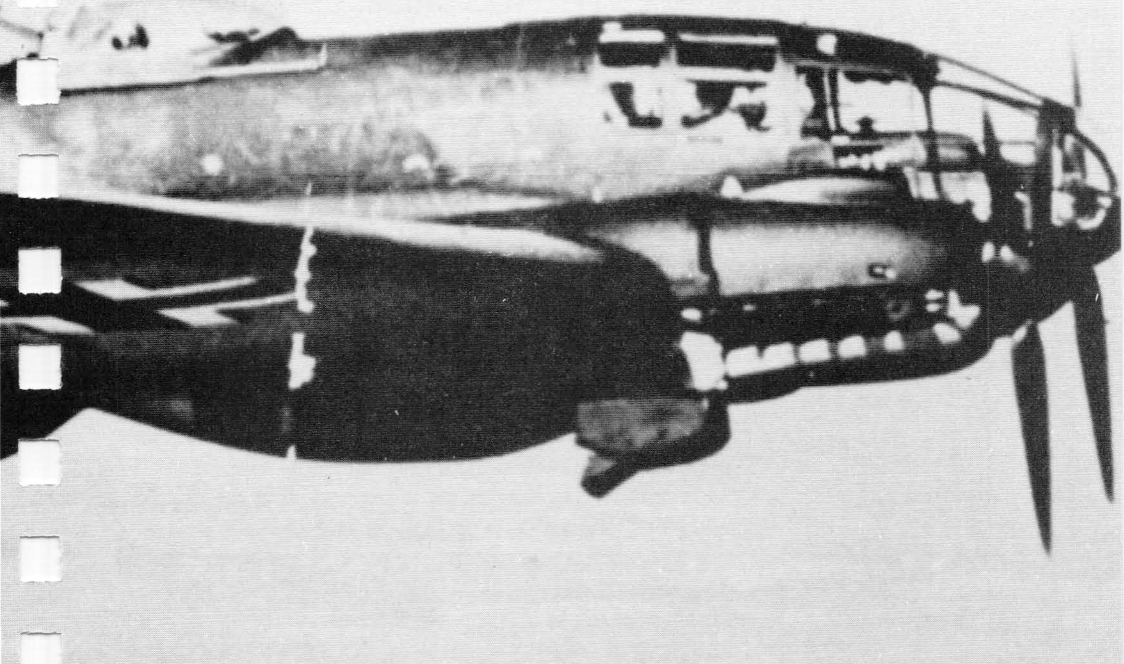
Armed with a total of twenty-four machine guns between them, three Spitfires climb together in a tight vic formation

.303 Browning Machine Guns

With eight Browning machine guns mounted on the wings of the Spitfire and Hurricane, these fighters provided an even match for the firepower of the Bf 109, with its two cannons and two machine guns. However, a lot of machine gun bullets were needed to bring down the more durable bombers. These machine guns had a somewhat greater muzzle velocity and rate of fire than their German counterparts, the MG 15 and MG 17.



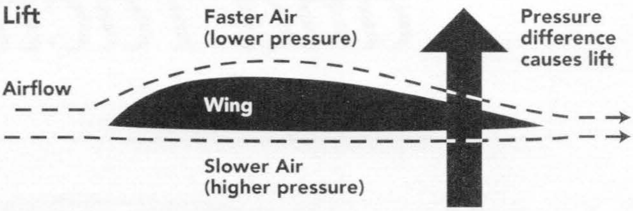
Flight Fundamentals and Tactics



FLIGHT FUNDAMENTALS

This section covers the dynamics of flight, both in a real aircraft, and in the fighters and bombers you fly in *Their Finest Hour.* Those paragraphs that apply to flying in the game are in italics.

At the time of the Battle of Britain, aircraft had become larger, heavier, and faster than ever before. Yet these 1940 fighters and bombers, like the supersonic military aircraft of today, utilized the same aerodynamic principles that the Wright Brothers first applied in 1903 at Kitty Hawk. And the most important of these principles of flight is known as **lift**.



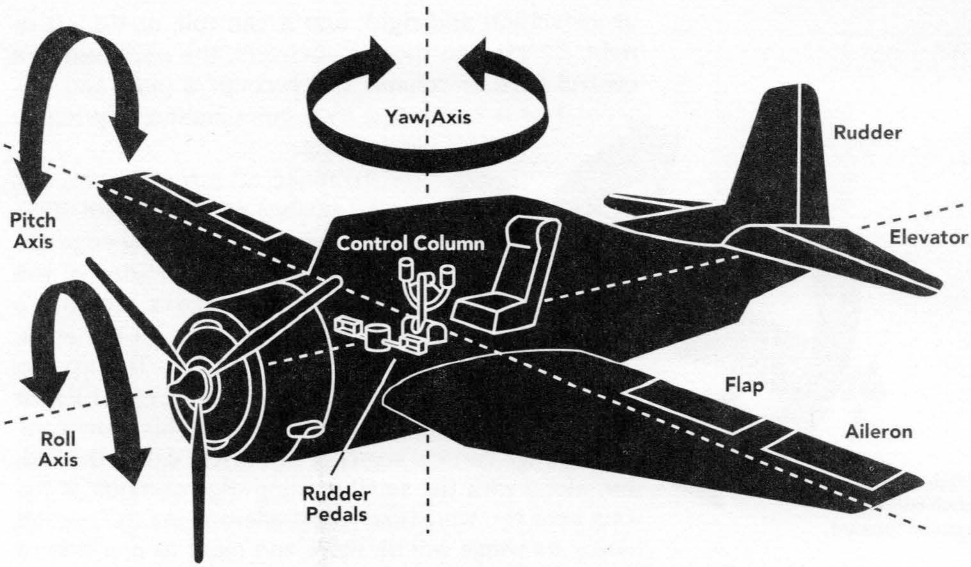
Try this simple experiment. Hold a piece of paper by one of its edges and blow across the top of it. The paper will rise. Why? Because the air moving across the top of the paper creates a high pressure zone greater than the pressure zone below the paper, which in turn creates suction and pulls the paper up. This is known as lift.

Substitute an aircraft wing for the piece of paper, and you have some idea of how a plane becomes airborne. Of course, a wing has a more streamlined, aerodynamic shape than a piece of paper. This shape is designed specially to create high and low pressure zones, and to ensure a smooth flow of air around the wing. Without a streamlined shape, too much **drag**, or wind resistance, is produced, which reduces the amount of lift.

A continuous flow of air is needed over and under a wing to sustain lift. To do this, an engine is used to push the aircraft through the air by providing forward **thrust**, or movement. The faster the forward thrust, the more lift is created. As a result, an aircraft can be large in size and weight as long as it is equipped with a powerful engine.

To increase your thrust, use the **+** *key on your keyboard. To decrease it, use the* **-** *key.*

Preceding page: An He 111 escorted by a Bf 109



Stalling

If the smooth flow of air around the wing is interrupted, a dangerous situation known as a **stall** can occur. An aircraft usually stalls when the wing is tilted upward at such a steep angle that it obstructs the airflow. A stall can also occur when the aircraft is moving too slowly. When an aircraft stalls, it can go out of control and crash.

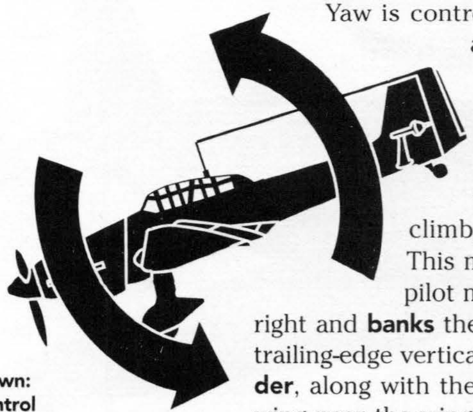
Your aircraft may stall if you've pulled the nose up at too sharp an angle, or if you let your airspeed drop to 60-80 MPH in level flight (this is known as the ***stalling speed*** *of your aircraft). If a stall occurs, push the nose of your aircraft down by moving the controller forward. When the message STALL RECOVERED appears on the screen, quickly pull back on the controller until your aircraft is in level flight again. Stalls frequently occur when you're trying to engage an aircraft that's at a much higher altitude. Learn to gain altitude gradually. Also, keep an eye on your airspeed indicator, and learn to listen for the distinctive sound that your engine makes when the plane is about to stall.*

> **"A terrific explosion rocked the hut and the tube went flat. The brilliant trace seemed to shrivel and then, as if in a final struggle for existence, flared up into a bright spot of blind light before it slowly faded away. Huge clouds of earth and mud covered the platform of the transmitter tower. The road was pitted with craters and great gaps were torn in the high steel rails enclosing the compound. Where the cook-house had been there was an enormous lake on which floated splintered planks of wood and all manner of kitchen utensils."**
> **Corporal Daphne Carne, WAAF, describing an attack on the RDF station at Rye**

In-Flight Maneuvering

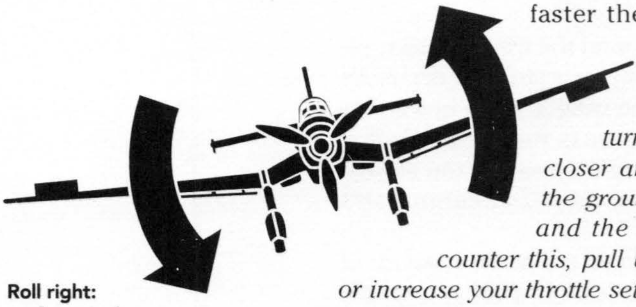
While an aircraft is in flight, it can maneuver three different ways. It can pitch, or move up and down; it can yaw,

or swivel left and right; and it can roll, or tilt left or right. To execute these maneuvers, the pilot moves a **control stick or column**, which controls pitch and roll. Yaw is controlled by a combination of pitching and rolling.



Pitch down: push control column forward

To make an aircraft dive, the pilot pushes on the control stick. This moves the trailing-edge (or rear) horizontal portions of the tail, called **elevators**, down. To climb, the pilot pulls back on the stick. This moves the elevators up. To turn, the pilot moves the control stick either left or right and **banks** the plane left or right. This moves the trailing-edge vertical segment of the tail, called the **rudder**, along with the small, trailing-edge sections of the wing near the wing tips, called **ailerons**. As the aircraft banks, its wings will tilt more and more to one side or the other. The steeper the bank, the faster the turn, up to a full 90° with the wings pointing straight up and down.



Roll right: push control column right

As you steepen a bank turn, and as your wings become closer and closer to perpendicular to the ground, your aircraft will lose lift and the nose will start to drop. To counter this, pull back on the controller slightly or increase your throttle setting when you bank. To come out of a banked turn, and return to level flight, move your controller in the opposite direction of your bank.

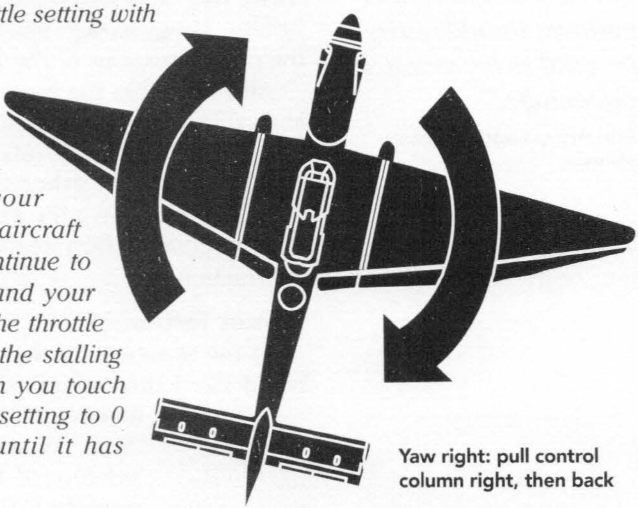
Takeoffs and Landings

To help an aircraft gain lift for takeoffs, and allow it to slow it down for landings, **flaps** are used. These are the large trailing-edge sections of the wings that, when extended downward, increase lift. This added lift allows the plane to fly at a slower speed before stalling. Of course, **landing gear** is also used for takeoffs and landings. It consists of the wheels of the aircraft and the supports for those wheels.

To takeoff from an airfield, increase your plane's throttle and taxi down the runway. When you reach the end of the runway, turn your plane around so that it's pointing down the runway in the other direction. Then, lower your flaps and increase your throttle until the white digital number at the bottom of the RPM indicator reads "100%." As your aircraft rushes down the runway, wait until the air-

speed reaches 125 MPH. Then, pull back on your controller to become airborne. Retract your landing gear (unless you are flying a Ju 87 Stuka with fixed landing gear), then decrease the throttle setting with the - key to conserve fuel.

When approaching an airfield to land, begin to slow your airspeed by decreasing the throttle setting. Gradually, flatten your descent, then line up your aircraft with the airstrip. As you continue to descend, lower your flaps and your landing gear, and decrease the throttle setting until it is just above the stalling speed of your aircraft. When you touch down, decrease the throttle setting to 0 and let your aircraft taxi until it has come to a complete stop.



Yaw right: pull control column right, then back

Dive Bomber Maneuvering

Speed brakes are special flaps found only on dive bombers. They open both up and down from the trailing-edge of the wing and are full of small holes to keep the aircraft from being buffeted when they are open.

If you're flying a Ju 87 Stuka or a Ju 88, use your speed brakes to slow your diving speed as you make your dive-bombing run on a ship convoy or ground installation. This will make it easier to line up the target and drop your bombload more accurately.



Luftwaffe fighter pilots discuss tactics on the wing of a Bf 109

"The fighter is simply a flying gun, and its basic qualities of speed and surprise should always be used to the greatest advantage."

RAF Group Captain Johnnie Johnson

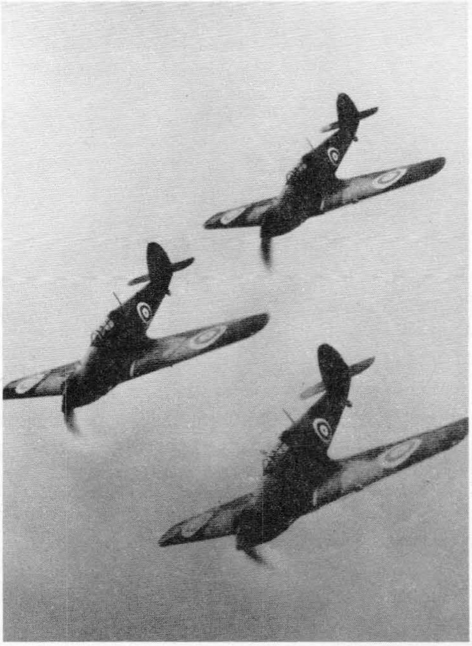
TACTICS

This section of the chapter describes tactics used by many RAF and Luftwaffe pilots during the Battle of Britain. Those paragraphs that will be helpful to you in the game situations of *Their Finest Hour* are in italics.

Also note that the replay camera is a useful tool for analyzing your performance in combat and improving your aerial tactics. It lets you "film" your dogfights, bombing runs, or other aerial maneuvers, and then view the "motion picture" from any angle. See the *Review Combat Film* section of the manual for more information.

Fighter Tactics

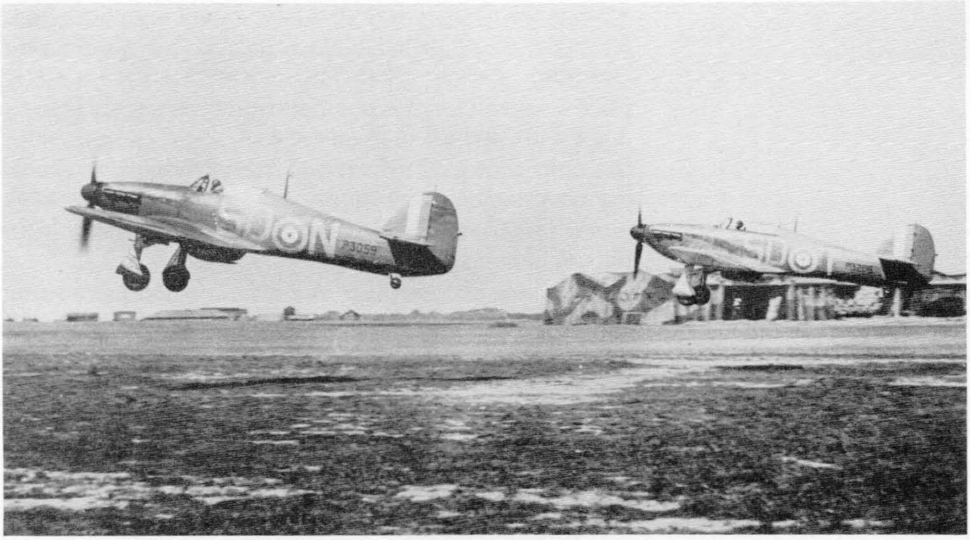
As the slower, more maneuverable biplane fighters of World War I evolved into the faster, less maneuverable monoplane fighters of World War II, the tactics of aerial combat evolved as well. Yet one of the keys to aerial victory remained the same throughout both wars: surprise the enemy.



A formation of Hurricanes. This fighter formed the backbone of Fighter Command in 1940

Gaining a height advantage was one way to achieve this element of surprise. The higher a fighter could get, the faster it could pounce upon the enemy aircraft below, hopefully without being detected until it was too late. Another way to surprise the enemy was to attack from the direction of the sun. Hidden in the sun's bright glare, a fighter pilot could strike before the enemy spotted him and retaliated. RAF pilots had an expression for guarding against this type of attack: "Beware of the Hun in the sun."

Attacking from the direction of the sun is a valuable tactic, since the enemy fighters or bombers you're attacking can't see you. To attack from the angle of the sun, first use the scan view mode to locate the sun, then use it to locate the enemy fighters or bombers you want to attack. Next, adjust your flight path so that your fighter will eventually be positioned between the sun and the enemy. When you reach this point, turn your fighter around and head toward the enemy. Ideally the sun should be at your back; if you can see the sun in your rear view mirror, you're in a perfect position to attack. Since you can't be seen, the enemy fighters won't take any evasive action or fire at you until you fire at them. Likewise, the bomber



A pair of Hurricanes take off to intercept approaching Luftwaffe aircraft

gunners won't fire at you until you open fire first.

In all of your missions, keep in mind that enemy fighters may use these same tactics on you.

When attacking from the direction of the sun, pilots would usually rely on the **stern attack**. To execute this approach, which dates back to the First World War, the attacking pilot would dive on a target, pull out of his dive when he was on the tail of the target, then fire. If the target aircraft had a rear or tail gunner, the attacking pilots would usually pull out of their dive and fire at an angle slightly beneath the tail of the target to avoid gunfire.

If you're flying a Spitfire or a Hurricane, and a Bf 109 is attacking you from behind, never try to dive away from it, since it can accelerate in a dive faster than you can. Instead, try to make a tight turn inside to shake it. A series of S-turns can also throw off its aim. But if you're flying a Bf 109, you can shake a pursuing RAF fighter by going into a dive. If you're flying a Bf 110, you won't be able to lose pursuing fighters with maneuvers, so use your rear gunner to ward off stern attacks, and try to bring your Zerstorer *around so that you can use its forward firepower.*

In the early part of the Battle of Britain, RAF pilots would sometimes fly straight at approaching enemy formations, and fire at them when they were within range. This was known as the **opposite attack**, and it was phased out after a number of head-on collisions.

With stern and opposite attack tactics, a fighter pilot could bring down an airplane by shooting straight ahead, since the target was right in front of him. But

when approaching and attacking an enemy plane from an angle, pilots on both sides had to learn **deflection shooting** to score a kill. This meant that the pursuing pilot would shoot at a point ahead of the enemy plane's flight path, so that the bullets would reach that point at the same time as the enemy. Mastering deflection shooting was extremely difficult, as Spitfires and Bf 109s could reach speeds of nearly 400 MPH, leaving little time to judge distance.

Deflection shooting is a skill you must master to enjoy success as a fighter pilot. You'll need to compensate for the speed of your target, the angle at which it crosses your line of sight, and its distance away from you, which you can judge by comparing the size of the enemy aircraft to

KEITH PARK



The brilliant commander of the embattled 11 Group during the Battle of Britain, New Zealand-born Keith Park was one of the great leaders of the Second World War. As a fighter pilot during World War I, Park shot down twenty enemy aircraft. Following the end of that conflict, he commanded a fighter station, and was later appointed senior air staff officer to Hugh Dowding. In 1939, Park was named air officer in command of 11 Group, whose fighters were responsible for coverage over London and Southeast England. During the evacuation of Dunkirk, Park's fighters continuously shuttled across the English Channel to intercept Luftwaffe bombers before they could attack the evacuation beaches. Although he was criticized for not providing more fighter protection over Dunkirk, the limited supply of aircraft available to him made this impossible. But the experience Park's squadrons gained while attacking bombers over France proved invaluable during the Battle of Britain, where they used similar defensive tactics. These fighters bore the brunt of the fighting during that summer, but Park managed his men and machines brilliantly. Although he had Dowding's full support, Park was criticized again and again for not fighting an offensive battle, though he had little time to send up the huge formations of aircraft required for such a tactic. In a power struggle that followed the Battle of Britain, Park was removed from command of 11 Group and assigned to a training squadron. However, Park did not remain in obscurity long, for in the fall of 1941, he was appointed air officer commanding at allied headquarters in Egypt. In July of 1942, Park became Air Officer Commanding at Malta. There his squadrons raided German convoys on their way to North Africa, greatly disrupting the flow of supplies to the German Army. Park's squadrons provided air cover for the invasion of North Africa, Operation Torch, in November 1942, and assisted in the invasion of Sicily and Italy in 1943. Park was appointed commander in chief of Middle East command in January 1944, and later served in Southeast Asia command, where his squadrons aided in the capture of Rangoon in 1945.

your gunsight ring. If the enemy aircraft is faster, flying a perpendicular flight path, or flying away from you, you'll have to lead your shots more. By taking all these factors into account, and remembering to shoot ahead of your target, you'll be able to score hits every time. You'll know your shots are hitting home when pieces of the enemy plane break off, or if smoke pours out of it.

To maximize a pilot's chances to score a kill, the eight machine guns on the Spitfire and the Hurricane were **harmonized**. This meant that the guns were adjusted so that when they were fired, the bullets would intersect at a certain point in the distance. This gave the pilots a large "area of lethal density" ahead of them. Unfortunately, this often penalized pilots who liked to shoot from close range, since their bullets did not intersect in the vicinity of the target. These pilots countered by adjusting their own guns so that their intersection point was much closer, allowing them to pour on highly-concentrated gunfire as they neared their target.

The machine guns of your RAF fighter are harmonized so that they will do more damage at close range than from long range. When you're approaching enemy fighters, there may be a few seconds when you'll be so close that you're able to make out the details of a particular aircraft. This is the time to open fire.

Since the machine guns on the Hurricane were more closely grouped together than those of the Spitfire, it had a denser bullet pattern. This made the Hurricane more suited for attacking bombers, since a bomber required more gunfire to bring it down than a fighter. Factored into this tactic was the knowledge that the Hurricane was not as maneuverable as the Bf 109, so while the Hurricanes took on the bombers, the more agile Spitfires attacked the German fighters.

A good rule to remember as a fighter pilot is that when you're in hostile skies, never fly in a straight or level path for more than thirty seconds.

"You must shoot at a spot out in space which will be full of airplane when your bullets get there."

U.S. Navy Lieutenant Commander James H. Flatley, on the fundamentals of deflection shooting

Fighter Formations

After the Luftwaffe fighters suffered heavy losses flying in tight three-plane formations during the Spanish Civil War, German ace Werner Molders developed and tested a loose fighter formation. Known as the ***Schwarm***, it consisted of four fighters flying in pairs, or ***Rotten***. The leader of this formation was the best pilot and best shot, and always flew ahead of the other three fighters. The second aircraft was the leader's protective wingman, and his job was to never leave the leader's

"I agree that at the beginning of the war we paid too much attention to close formation. There was tight wing-tip to wing-tip flying, with everybody looking round to keep the correct distance from his neighbour and that sort of thing. Circumstances forced us to relax that."
RAF Air Chief Marshal Sir Hugh Dowding

"Never climb, never dive, just turn."

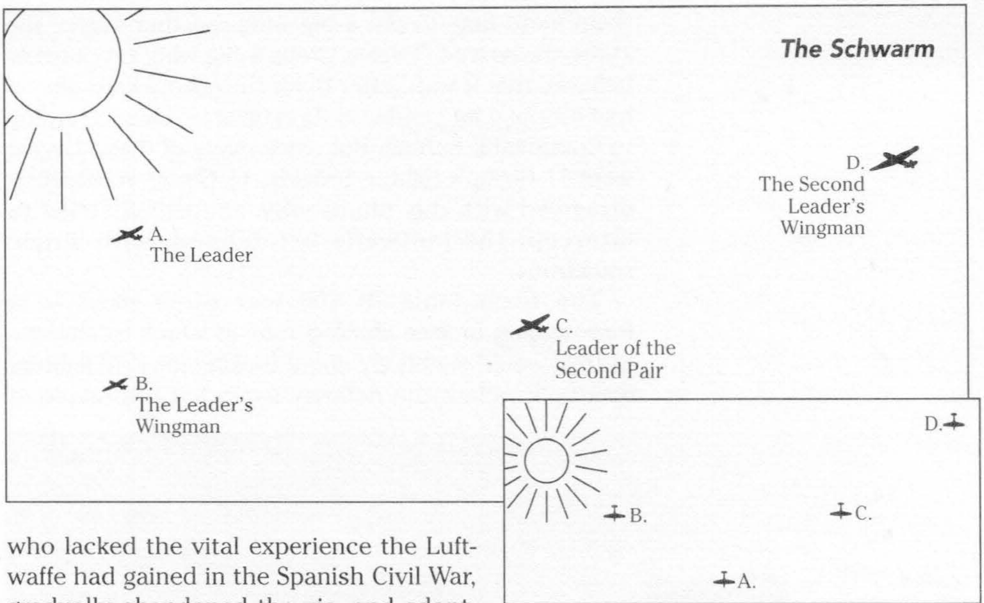
Spitfire pilot Peter Townshend's philosophy on dogfighting against Bf 109s

side. The wingman always flew on the side of the leader where the sun was, though at a lower altitude so that the other aircraft would not have to look into the sun to see him. On the opposite side from the wingman was the leader of the second *Rotte*, and at his side, though at a higher altitude, was his wingman. The second wingman always had the job of scanning the sky around the sun, and watching for enemy attacks from that direction. Since the *Schwarm* was so spread out, it was harder for enemy fighters to spot it, and it had the added benefit of minimizing the risk of collision within a formation. The result was a high rate of kills for the Luftwaffe fighters during the remainder of the Spanish Civil War and the early stages of the Battle of Britain.

During the time between the two world wars, the British, believing that their fighters would be attacking unescorted bombers, developed a tight formation known as the **vic**. Essentially the same formation the Luftwaffe abandoned in Spain, it consisted of three fighters flying at the same altitude, with the middle fighter slightly ahead of the other two. Flying wing tip-to-wing tip, the vic was a great formation for air shows, but with each pilot constantly worrying about collision, it left little time to look for the enemy. This made the RAF fighters easy targets for the looser-flying Luftwaffe fighters, who could also spot the tight British formation sooner. As the Battle of Britain progressed, RAF pilots,

Bf 109s prepare to take off from an airfield in France.





Two versions of the *Schwarm*. The small diagram shows the view from below the formation

who lacked the vital experience the Luftwaffe had gained in the Spanish Civil War, gradually abandoned the vic, and adopted their own version of the *Schwarm*, which they called the **finger four** formation.

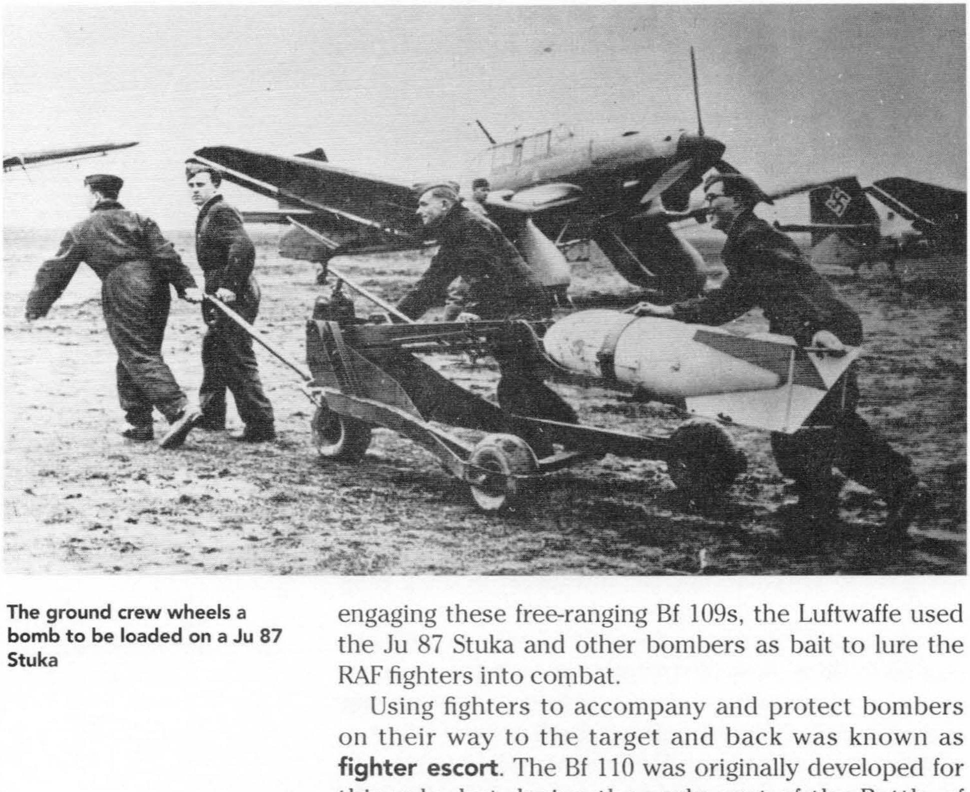
If you're flying as the leader of a Schwarm *or a* vic *formation, you're responsible for leading the attack on the enemy. It's important that your wingmen remain at your side for protection; therefore don't fly so radically that you lose them. If you're flying as a wingman in either of these two formations, your primary responsibility is to cover your leader, and to stay by his side.*

A controversial fighter formation that the British developed during the Battle of Britain was the **big wing**. It was made up of three to five squadrons, totaling some thirty-six to sixty aircraft. The advantage of a big wing was obvious — more guns were brought to bear on the enemy aircraft. Moreover, the sight of so many fighters proved to be a show of strength unnerving to the Luftwaffe. The disadvantage of the big wing was the amount of time it took all the aircraft to takeoff and assemble — usually over half an hour. Also, the more RAF fighters in the air, the more that could be knocked out by the Luftwaffe, who saw aerial combat as the best way to finish off Fighter Command.

The debate over the feasibility of the big wing divided Fighter Command. Eleven Group felt that the big wing was impractical, since its beseiged squadrons simply did not have enough time to assemble such a large formation. Twelve Group, which originated the big wing, was located further north than 11 Group, and this gave

them more time to put a big wing together before the Luftwaffe arrived. Twelve Group's big wing proponents believed that it was better to hit the enemy hard after it had dropped its bombs on its targets and was returning to Continental Europe. But since many of these targets were 11 Group's fighter airfields, 11 Group vehemently disagreed with this philosophy, and usually tried to intercept the Luftwaffe beforehand, with single squadrons.

The formidable Bf 109 was often used in a **free-ranging** or **free chasing** role, in which formations of 109s would simply fly about looking for RAF fighters to attack. When the defensive-minded RAF avoided



The ground crew wheels a bomb to be loaded on a Ju 87 Stuka

engaging these free-ranging Bf 109s, the Luftwaffe used the Ju 87 Stuka and other bombers as bait to lure the RAF fighters into combat.

Using fighters to accompany and protect bombers on their way to the target and back was known as **fighter escort**. The Bf 110 was originally developed for this role, but during the early part of the Battle of Britain, it proved to be a failure against the more maneuverable Hurricane and Spitfire. The Bf 110 was successful only when it could dive down and blast the enemy with its two cannons and four machine guns, then get away. As Bf 110 losses mounted, they were given a protective escort of Bf 109s, and the 109 became the main escort fighter for the duration of the Battle.

If you're flying fighter escort, your main responsibility is

to make sure the bombers reach their targets and escape enemy fighter attacks. Try to keep the bombers in sight at all times, and beware of enemy fighters pouncing on them from the direction of the sun, or from high above.

During the *Kanalkampf*, providing fighter escort for Ju 87s proved to be next to impossible during a dive-bombing run, since the Stukas were slowed by their dive brakes and bombload. Their escorts, the much-faster Bf 109s, flew right past the Stukas during a dive, leaving them unescorted, and easy targets for Spitfires and Hurricanes. As Ju 87 losses increased, their crews began demanding more fighter escort, and the fighter-to-bomber ratio, which had been one to one, was increased to two to one.

When the Stukas were withdrawn from the Battle of Britain in mid-August, Luftwaffe bomber formations were escorted by formations of Bf 109s, flying several thousand feet higher to gain a height advantage over the attacking British fighters. But British fighters in turn took advantage of this height difference, and pulverized the bombers before the Bf 109s could dive down. Again, the increasing bomber losses forced the Luftwaffe to change its escort formations. Bf 109s were then ordered to fly alongside the bombers, at the same altitude. The fighters were forced to throttle way back to stay at the same speed as the bombers, and often weaved in and out of the bomber formations. This cut down on bomber losses, but it also cut down on RAF losses, since the 109s were now in a defensive, rather than an offensive, role. The fighter-to-bomber ratio was increased to three to one, and formations of fighters flew ahead of, alongside, and above the bombers.

"{T}he Spitfire had a marvellous rate of turn and when we were tied to the bombers and had to dog-fight them — that turn was very important."

Luftwaffe Bf 109 Pilot Gunther Rall

Spitfire Pilot Al Deere was leading a formation over the Channel when he encountered a German rescue seaplane, escorted by Bf 109s. As he dove on the enemy, one of the 109s turned around, and headed toward him head-on. Guns blazing, the two aircraft swept toward each other, then Deere saw the terrifying shape of the 109 scrape the top of his Spitfire as they collided. The Spitfire's propeller blades were bent back, and smoke and flames poured from its engine. Unable to free himself to bail out, Deere managed to glide his plane down to a field, where he smashed the hood open with his bare hands to escape the burning wreck.

Dive-Bombing Tactics

When the tactics of dive-bombing were being developed during the period between the wars, the RAF took little interest. But the Luftwaffe, seeing dive-bombing as a way to soften up an enemy before ground troops moved in, embraced the concept, and developed the Ju 87 Stuka dive bomber in 1935. The Stuka became a formidable weapon in the conquest of Europe, although it had limited success against the convoys and coastal targets of the English Channel during the Battle of Britain.

"They attracted Hurricanes and Spitfires as honey attracts flies."
Luftwaffe Major Adolf Galland, referring to Ju 87 Stukas

What made dive-bombing so appealing was its pinpoint accuracy. Theoretically, if a plane could dive straight down on a target before releasing a bomb, there was no way it could miss. Though Stuka pilots rarely made vertical dives, 80° dives generally resulted in deadly hits.

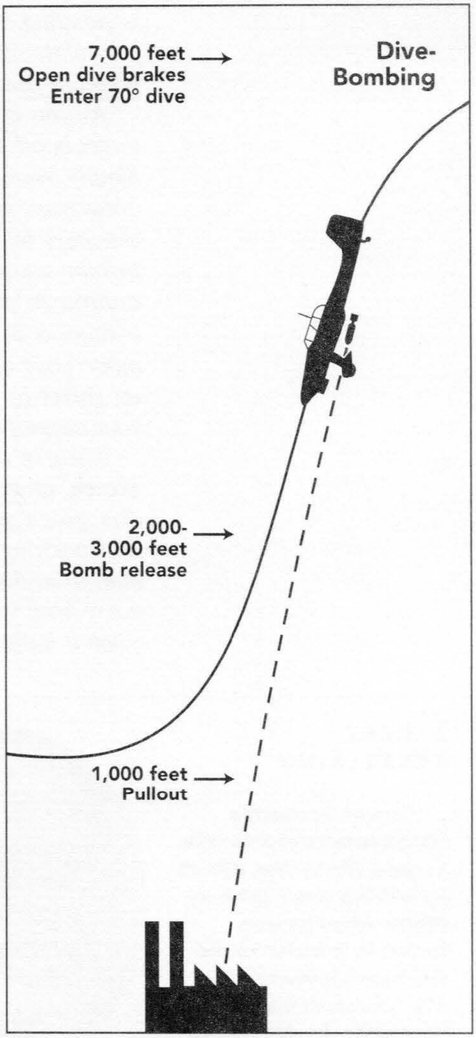
Flying at an altitude between 10,000 and 15,000 feet, the Stuka pilot would spot his target, and begin to dive when he was nearly over it. Dive angle lines were even etched onto the glass canopy of the Ju 87, to give the pilot an idea of his angle of approach. As the Stuka picked up speed in its dive, the pilot would extend the dive brakes, which slowed the airspeed and enabled the pilot to make a more controlled dive. Along with the brakes, the drag on the fuselage caused by the externally-mounted bomb and the fixed landing gear slowed the Stuka's diving speed to around 350 MPH. With the landing gear-mounted sirens, called the "trumpets of Jericho," screaming in the wind, the pilot would release the Stuka's fuselage-mounted bomb at an altitude of 3,000 feet. If the bomb was released any lower, the Stuka would be in danger of being destroyed by the resulting explosion, since it needed another 1,500 feet to pull out of its dive and level off. Once the pilot had released the bomb and pulled out of his dive, he would often make evasive turns to avoid any anti-aircraft fire or enemy fighters. And if he looked over his shoulder, he might get a glance at the damage inflicted by the bomb he just delivered.

If you're flying a Ju 87 dive-bombing mission with other Stukas, there will always be one or more Stukas flying ahead of you. When you're about five miles from the tar-



Looking down the barrel of a wing-mounted 20 mm cannon on a Bf 109

get, all the Stukas will assemble into a **line astern** *formation, lined up one after another. If you've strayed away from the formation, you'll see a space where your Stuka should be. After you've returned to the formation, you'll be able to follow the Stuka ahead of you as it dives down to attack a ground installation or ship.*



When you're piloting a solo Ju 87 Stuka or Ju 88, switch on the scan view mode to help you locate the target you want to dive-bomb (see the Double-Seat Fighter and Dive Bomber View Controls *section for more information). In this view mode, you can fly the plane in one direction while searching in any direction. When you spot the target, make a note of its location in degrees, switch back to normal flight, and change the direction of your dive bomber so that will fly over the target. Switch back to the scan view mode if you have trouble locating the target in normal flight. As you get closer to the target, switch to the straight down view mode. If you have lined up your target correctly, it will slowly begin to appear in the screen. This is the time to begin your dive. Ideally, you should be at an altitude of 7,000 feet or more when you start diving; if your starting altitude is below 5,000 feet, you may have trouble pulling out of your dive in time.*

To begin your dive, make sure you're in normal flight, and extend your speed brakes. You may want to turn on your replay camera to record your dive and see if your bombload hit home, and check your bomb indicator to determine which of your bombs will drop. If you're bombing a large target, such as a ship, you'll want to drop your entire bombload at once. If you're attacking scattered ground targets, such as airfield hangars, you'll want to scatter your bombs on different targets. Then, when you're ready, push the controller forward until you're in a 70° to 80° dive. The Ju 87 has several diving angle lines etched in the left window. Four of these lines are labeled 50°, 60°, 70°, and 80°. Switch to the view left mode to line up any of these diving angle lines with the horizon. You can also use your pitch indicator to judge how steep your descent is. If its needle

is pointing three-quarters of the way down the minus (-) part of the indicator, you're in a 70° dive. Try to keep the target in your gunsight ring on your way down.

As you dive, you may find that your approach to the target is off, and that it's straying to one side or the other. Simply moving your controller to the side to correct this is dangerous, since it could cause your dive bomber to move sideways relative to the direction it's headed (a condition known as **slipping** *or* **skidding***). To correct your approach, push the controller forward until your dive bomber is in a near-vertical dive, approaching 90°. Then, move your controller left or right until the target is lined up correctly, and pull back on the controller to return to your desired diving angle.*

If you're attacking a ship in a convoy, a **longitudinal attack***, along the line of the ship's course, is best, since this gives you a longer area for your bombs to hit. Approaching the ship from the bow is more preferable than from the stern, as in a stern attack the ship will sail away from you and you'll have to flatten out your dive to catch it further along. However, don't waste valuable time*

ALBERT KESSELRING



One of Germany's ablest commanders in the Second World War, Albert Kesselring was a gunnery officer when he was forced to transfer to the still-secret Luftwaffe in 1933. Despite his initial reluctance, he took to his new position, even learning how to fly at age forty-eight. He rose to become Luftwaffe chief of staff, and commanded Luftwaffe units during the 1939 invasion of Poland, where he authorized the large-scale bombing of Warsaw. He also participated in the invasion of France, Belgium, and the Netherlands, and his Luftwaffe units bombed Rotterdam and attacked the retreating British troops at Dunkirk. During the Battle of Britain, Kesselring commanded Luftflotte 2, located in France and Belgium with airfields closest to England. His units were in the thick of the fighting against the RAF, and although they were successful attacking the airfields of Southern England, the decision to switch to bombing London (which Kesselring supported) enabled the British to gain victory. Nicknamed "Smiling Albert" for obvious reasons, Kesselring was an energetic, high-strung leader and extremely loyal to the men he commanded. In 1941, he was appointed commander in chief, South, and co-directed the campaign in North Africa with Erwin Rommel. He later became commander in chief in Italy, and directed a stubborn defense that bogged down Allied troops for over a year. In March of 1945, he took over command of the Western Front, but the situation there was hopeless, and he surrendered his forces to the Allies on May 7.

making a perfect approach. With practice, you'll be able to score direct hits even with a perpendicular attack on a ship.

If you're attacking ground installations, they will be easier to hit than ships, because they aren't moving. But no matter which type of target you're attacking, ignore the bursts of flak or gunfire around you, and concentrate on your mission objective, since it is vital.

When your altitude reaches 3,000 feet, you should get ready to release your bombload, and release it before your altitude reaches 2,000 feet. If you're in a 70° dive, your gunsight should be pointed just ahead of where you want your bomb or bombs to fall. This will compensate for gravity pulling your bombload out of the line of your dive. Once you've released your bombload, pull back on the controller to pull out of your dive. In the Battle of Britain, this was the time when dive bombers, particularly the Ju 87 Stuka, were the most vulnerable to enemy fighter attack, since their airspeed was slowed and their fighter escort gone, unable to stay with the dive bombers in a dive. To avoid what the RAF fighter pilots called a "Stuka party," make sure that your dive bomber is in level flight after you've pulled out of your dive, turn on the autopilot, then switch to the rear gunner. Use your forward guns if an unlucky fighter happens to wander in front of you. If you're flying a Ju 88, you may want to switch to the upper dorsal gun position to ward off fighter attacks. You can also weave your dive bomber around to make it a harder target for enemy fighters to hit.

"They come down on you out of the sun like ruddy thunderbolts."

RAF Group Captain Al Deere, describing Luftwaffe fighter tactics

Low and Medium Altitude Bombing Tactics

Low altitude bombing raids, from heights of several hundred feet or less, proved to be highly successful against airfields, radar stations, and other targets. At the low height these bombers flew, the RDF system couldn't detect them, and the Observer Corps on the ground had trouble spotting them. Low altitude surprise attacks also gave anti-aircraft batteries little time to react, and thus gave the planes an excellent chance to get away after dropping their bombloads. Bombers also had a better chance of scoring more accurate hits from low levels. The main Luftwaffe bombers for low altitude bombing raids were the Ju 88, which was structurally reinforced to serve double-duty as a dive

At a meeting of Luftwaffe *Geschwader* leaders, Hermann Goering asked each one what they needed. Adolf Galland replied, "I should like an outfit of Spitfires for my group, Herr Reichsmarschall." Even though Galland made this remark to point out his frustration at the stubbornness of the upper levels of command and the impossible orders that he and his men were forced to execute, Goering took Galland's words too literally. With a growl, the miffed "Iron Man" stormed out of the meeting.



The rear gunner of a Bf 110 *Zerstorer* takes aim

bomber, and the Do 17. The fighter/bomber versions of the Bf 109 and the Bf 110 were also used for low altitude bombing.

If you fly your mission from an altitude of less than 500 feet, you won't be detected by the radar system, and they won't send any fighters after you. More important, you may be able to fly to your target without being seen by any high altitude fighter patrols. However, there's always a chance that a low altitude fighter patrol will spot you. For low altitude bombing, it's more accurate and less dangerous to drop your bombload from the pilot's position than from the bombardier's position.

The majority of the Luftwaffe's bombing raids came from medium altitudes of 11,000 to 18,000 feet, depending on the cloud cover. It was essential to the success of medium bombing raids that the ground be visible from the bomber, since in 1940 landmarks had to be visible from the plane for navigation, and targets had to be spotted before they could be bombed. In a medium altitude bombing mission, the bombers flew directly to the target, released their bombs, and headed directly back to their bases. If the bombers spent more time than necessary over England, they would be in jeopardy of losing their fighter escort, because the Bf 109s only carried enough fuel to remain over England for twenty to thirty

minutes. The He 111, the Do 17, and the Ju 88 served as the main medium altitude bombers for the Luftwaffe.

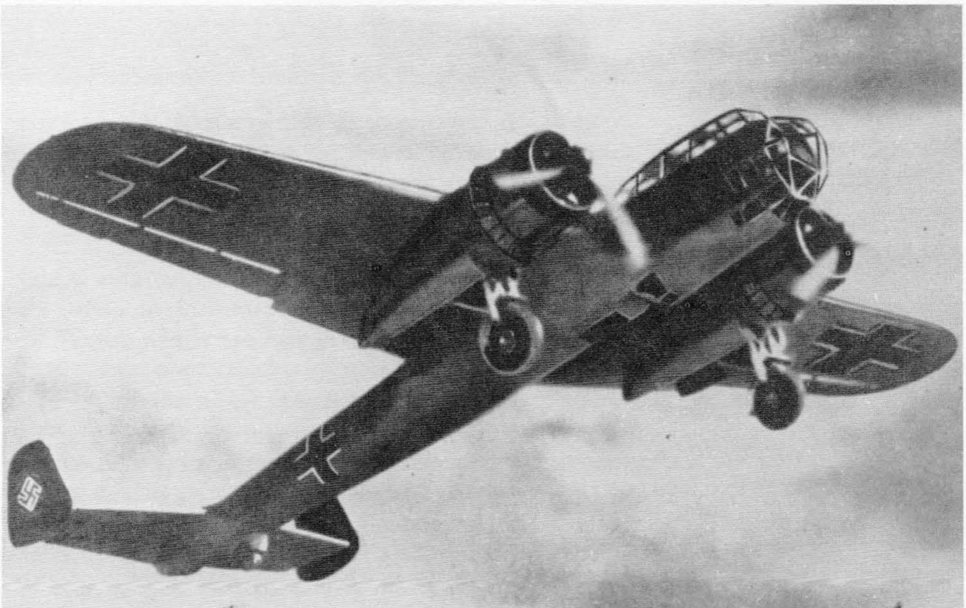
If you're flying a bomber and are attacked by enemy fighters, maintain a tight formation. This allows the gunners on the other bombers to protect the formation.

It will take a lot of practice to learn how to drop a bombload accurately from a medium altitude. To give yourself some benchmarks, always drop your bombload from the same altitude and at the same speed on all your missions. Then, use the rings on your bombsight to gauge the precise moment when you should drop your bombs on a target.

Bomber Gun Positions

The best way to defend your bomber from enemy fighter attack is to learn to read the flashing yellow gun indicator lights. When you see a flashing light, it means that an enemy plane is approaching, and you could be attacked from that position. Look at the lights, determine which position is being attacked, and move over to that position. If you feel that some positions are not as critical to defend as others, switch those less-important positions to the autoshoot mode. However, bear in mind that when a position is in the autoshoot mode, it will use up its ammunition faster. Also, it will not be able to see enemy aircraft attacking from the direction of the sun, which you

A Do 17 becomes airborne. Note the slender fuselage, which gave it the nickname "Flying Pencil." ***Courtesy of the Aeroplane Temple Press Ltd.***





The crew of an He 111 just before taking off on a night bombing mission

yourself are able to do. Deflection shooting is as important for bomber gunners as it is for fighters (see Fighter Tactics *above for more information).*

Night Bombing Tactics

The Luftwaffe made scattered bombing raids at night throughout the spring and summer of 1940, and switched over entirely to night bombing in the fall and winter, as daylight raids were proving too costly. Night bombing had many advantages. The bombers could fly virtually undetected after they passed the coast, since then the RDF system could no longer pick them up and the Observer Corps could not see them. British ground defenses had to rely on listening for the sounds of the bomber's engines to track them, and this difficult task was made virtually impossible by bad weather and the varying speeds of German aircraft. Since airborne radar had not yet been developed for RAF fighters, they were

virtually useless in the dark, and only a few German bombers were brought down by fighters at night. Yet this same darkness that hindered Fighter Command also prevented the Luftwaffe from finding and hitting blacked-out targets accurately.

However, the Luftwaffe did possess a navigational aid which could have made night bombing much more formidable. It was a radio beam known as *Knickebein*, or "crooked leg." The *Knickebein* signal radiated from Germany or France, and pointed toward a target in England. A bomber pilot, flying along this beam, which was a few hundred yards wide, heard a series of dot and dash codes if he strayed too far left or right. As the bomber approached the target, it would intersect with a second beam, which was transmitted from a different location on the Continent. This beam gave a different sound, and was the signal to prepare to drop the bombload. The bomber released its bombs a predetermined distance from where the second beacon was received.

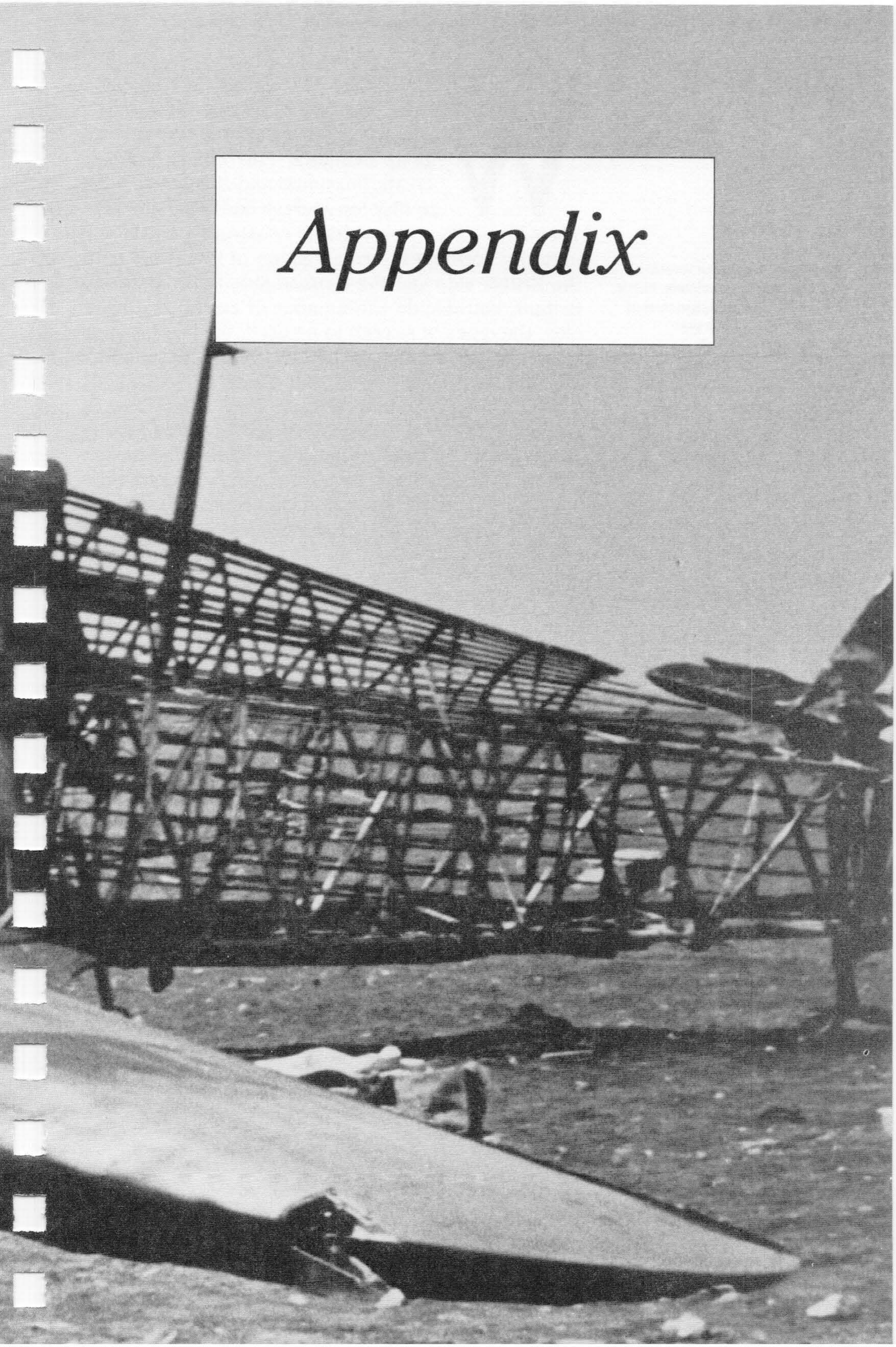
But the British, who had known about *Knickebein* ever since early 1940, developed countermeasures to hinder its effectiveness. Special detection equipment was installed on top of the 350-foot-high RDF masts along the British coast, and technicians precariously sat on the masts and listened for incoming beams. The Germans usually tested a beam the morning before a raid, and by plotting the direction of the beam, the British usually figured out which target was likely to be bombed that night. Then, the British overpowered the *Knickebein* beam by transmitting beams of their own, making it impossible for Luftwaffe bomber pilots to hear the correct beam. Often the British beam would be misinterpreted as the second German beam, and many German bombloads were dropped in the ocean or scattered throughout the countryside by crewmen who thought they had hit their target.

> **"We really wasted our fighters. We didn't have enough to begin with, and we used them in the wrong way, for direct close escort. We were tied to the bombers flying slowly — sometimes with flaps down over England. We couldn't use our altitude advantage, nor our superiority in a dive."**
> **Luftwaffe Bf 109 Pilot Gunther Rall**

These British countermeasures were not always successful, yet for the most part they blunted the weapon of night bombing. Although airfields, factories, ports, and cities were hit at night throughout the close of 1940 and into the beginning of 1941, these raids, which might have brought Britain to its knees, did not.



Appendix

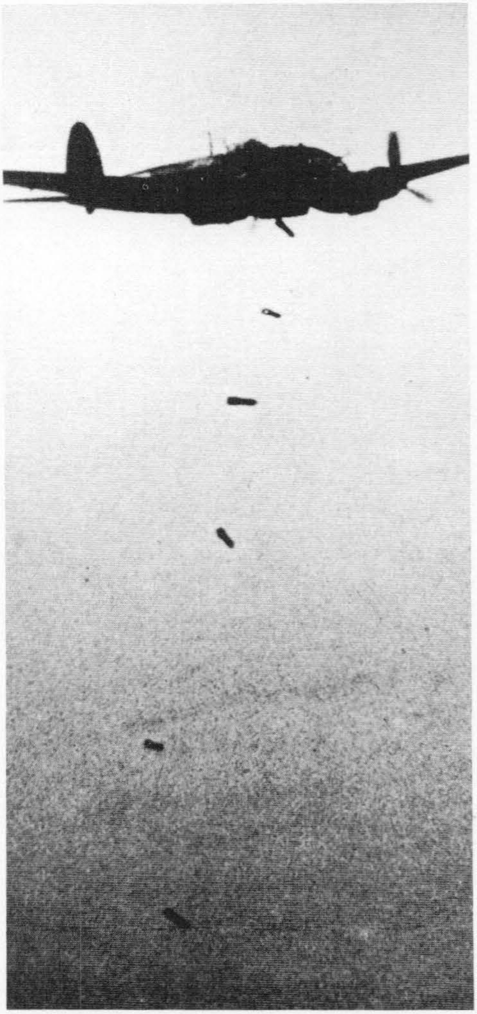


MISSION BUILDER

When you use the Mission Builder, you get a chance to become your own game designer. This utility lets you create missions, and then save them to disk for yourself and others to fly in *Their Finest Hour*. You actually construct a battle scenario by deciding the composition of forces for both the British side and the German side in the Battle of Britain. You decide the number of aircraft for each side, the types of aircraft to be used, the flight groups they'll fly in, and more. Once you finish designing a mission, you save it, and then select FLY CUSTOM MISSION from the Main Menu of *Their Finest Hour* to fly it. You can even go back and modify it later if you want. With the Mission Builder, there's no end to the variety of combat mission challenges you can create, both for yourself and for your friends.

Preceding page: The wreck of an unfortunate Hurricane. Note the metal tube construction of the fuselage, which was surrounded by fabric.

Below: An He 111 drops its bombload on a target in Southern England.



HINT: Before you sit down in front of your computer to create a mission, plan it out on paper. Since there are so many choices you need to make, building a mission with the computer can be tricky without a plan to work from.

LOADING THE MISSION BUILDER

To start up the Mission Builder on your computer, look at the *Loading Instructions: Mission Builder* section of your Reference Card. Then continue by following the instructions below.

USING THE MISSION BUILDER

Once you've loaded the utility, you'll see a special map, which shows Southern England, the English Channel, and the west coast of France, with the words MISSION BUILDER at the top. This map is nearly identical to the Campaign Map you access whenever you're playing Campaign Missions. If you've already fought a campaign battle, you'll notice that many of the controls used for playing a campaign are the same

ones used for building a Custom Mission. You'll use this map and the buttons on it to determine the forces for both sides of your mission.

The markings on the map indicate different ground installations that can be attacked by the Luftwaffe or defended by the RAF. To learn the name of any of these ground installations, move the arrow over a ground installation icon. You'll see the information in the column in the lower right-hand corner of the screen.

At the bottom of the screen, you'll see five buttons:

LOAD This lets you load the missions you've already created, so you can make any modifications to them. When you choose this, you'll be shown a list of your missions. If the list is long, move the arrow to the down arrow icon, and hold down the controller button; to look up the list, move the arrow to the up arrow icon, and hold down the button. Click the arrow on the name of a mission to load it. The name of the mission you've selected will appear next to the word NAME at the top of the screen.

SAVE This lets you save a mission you've just created, so you can play it from the game program at a later time. Your mission will not be saved unless it has been given a name. To name your mission, click the controller on the white area labeled NAME at the top of the screen. A text cursor will appear. Use it to type the name of your mission, then press **RETURN**.

NOTE: If you build a mission with more than three different types of aircraft, you won't be able to save it, as it requires too much memory during game-play.

NEW This cancels any mission-building choices you have made, so you can start building a mission all over again.

SETTINGS This lets you change the mission settings for the plane that you yourself will fly in your mission.

EXIT This returns you to your computer's operating system.

Flight Groups

When you create a Custom Mission, you'll begin with up to sixteen aircraft, although you don't have to use all sixteen in every mission you create. To divide these available aircraft between the British and the German sides, you'll need to assign them to various flight groups for both sides. A flight group is a given number of aircraft flying together as a unit. By choos-

"I personally have taken over the leadership of the attacks against England, and for the first time we have struck at England's heart. This is an historic hour."

Reichsmarschall Hermann Goering, after the Luftwaffe bombing raids on London on September 7, 1940

"Strength lies not in defense but in attack."
Adolf Hitler, *Mein Kampf*

ing the type of aircraft and the number of aircraft for each flight group, you allocate aircraft to either the RAF or the Luftwaffe in your mission.

Here's an example. Let's say you're creating three flight groups for a mission; the first with six He 111 bombers, the second with six Bf 109 fighters. The Luftwaffe now has twelve aircraft on its side in your mission. Now, the most aircraft the RAF can have on its side in the third flight group is four.

Of course, you can put all of your available aircraft on only one side, and create a mission with no enemy aerial opposition. But, as you'll find out, it won't be very challenging or interesting. Also, if you have a slow machine, you won't want to have the aircraft bunched together in the same location, since the mission will be more enjoyable when they're spread out.

HINT: Even though you have a limited number of aircraft, if you create a fighter flight group, and it is destroyed, a flight group of similar composition can be vectored to take its place. If you'd like to use this feature in your missions, see the WAVE button below.

Building Your Opposing Forces

To determine the composition of your forces, you'll use the seven Flight Group buttons on the right side of the screen:

FLIGHT GROUP Click your controller button to cycle through the flight groups that are available to be filled, and to look at the ones you've already created. To create a flight group, you must select a plane type (see below) and allocate at least one plane to that flight group.

You yourself will always fly in the first flight group, called FLIGHT GROUP 1. The default setting for this group will always have you flying a Spitfire. This can be changed by using the PLANE TYPE button below.

PLANE TYPE Click your controller button to cycle through the different types and models of aircraft that can make up a flight group. (For example, "SPITFIRE" is a type of aircraft, and "MK I" designates its model number.) Each flight group must consist of the same model of aircraft. For instance, you cannot create a flight group with both Spitfire Mark Is and Spitfire Mark IIs. However, you can create one flight group of Mark Is and a second one of Mark IIs.

PLANES This lets you change the number of aircraft in the flight group you're creating. You need to have at least one plane in the flight group before that

group can fly in your mission. Pressing the left controller button increases the number, and pressing the right controller button decreases it.

The number of planes you have left to assign will be displayed in the upper right-hand corner of the screen, next to the words PLANES AVAILABLE.

The number of planes on your side, along with the number of planes on the opposition side, will be displayed below PLANES AVAILABLE.

The maximum number of planes you can have in a flight group is six.

FORMATION Use this to cycle through the available flight formations your current flight group can fly in. These formations are the "VIC" (a triangular three-plane formation), the "SCHWARM" (a spread-out four-plane formation), "ASTERN" (a single-file formation), and "ABREAST" (a side-by-side formation). For more information about the vic and the *Schwarm*, see the *Flight Fundamental and Tactics* chapter of the manual.

EXPERIENCE Use this to cycle through the amount of combat experience a flight group can possess.

ORDERS Click your controller button to cycle through the mission orders for the flight group you're creating. When you're composing the RAF forces, you can choose to have your fighters attack either enemy bombers or fighters, or to ignore or avoid an attack. If you're composing the Luftwaffe forces, the choices vary, depending upon the type of aircraft in your flight group. The He 111 and the Do 17z-2 can level-bomb, the Ju 87 Stuka can dive-bomb, and the Ju 88 can be used for both level bombing and dive bombing. The Bf 109 and 110 fighters can be used for bomber escort (protecting a bomber flight group), for free-ranging (hunting RAF fighters), or for strafing airfields. Bf 109 and 110 *Jabo* fighter/bombers can be used for either level bombing, or for bombing and strafing airfields. Both RAF and Luftwaffe forces can also be ordered to return to their home airfield.

WAVES Use this to choose the number of times the fighter Combat Air Patrol (CAP) aircraft in an enemy flight group will be reinforced. What this means is that if a wave of fighters is destroyed, another one will be vectored to the battle area to take its place. The number to the right of the WAVES button indicates the total number of waves that can appear in your mission. This number also includes the initial wave that you start with. For example, if you choose "4," your first wave of fighters will be reinforced up to three

> **"I wondered idly what he was like, this man I would kill. Was he young, was he fat, would he die with the Fuhrer's name on his lips, or would he die alone, in that last moment conscious of himself as a man? I would never know. There I was being strapped in, my mind automatically checking the controls, and we were off."**
>
> **RAF Pilot Officer Richard Hillary**

times. If the number to the right of the WAVES button is "1," the flight group will not be reinforced.

If you've chosen to have the flight group fly a fighter escort mission, this button will change to ESCORT. Then, you use this button to select which bomber flight group your fighters will escort.

Flying Your Own Aircraft as Leader or Wingman

At the top of the screen, in the upper right-hand corner, you'll see a button marked PLAYER. Pressing this button switches your plane between the LEADER, whose plane is leading the formation, or WINGMAN, whose plane has the responsibility of covering the leader. If you're flying a bomber, you cannot fly as the leader.

Flight Rosters

Like the other missions in *Their Finest Hour,* you can select pilots and crews to fly the aircraft in your custom mission when you're at Flight Briefing in the program. However, if you create a mission with more than seven aircraft on your side, you'll only be able to assign pilots and crews from the ROSTER screen to the first seven planes.

Creating a Flight Plan

After you've created a flight group, you need to implement a flight plan for it to follow. You create a flight plan by placing a series of navigation markers on the Mission Builder map. A flight plan is composed of up to six of these navigation markers, including its starting point (BEGIN), four rendezvous points (WAY PT 1, WAY PT 2, WAY PT 3, and WAY PT 4) and an airfield to return to (LAND).

To create a flight plan, look below the Flight Group buttons. There, you'll see a chart that looks like this:

FLIGHT PLAN	ALT	ATK
BEGIN		
WAY PT 1		
WAY PT 2		
WAY PT 3		
WAY PT 4		
LAND		DELETE

To choose where you want a flight group to start its mission, click on BEGIN. A star will appear next to the word BEGIN. Move the floating arrow to the location on the map where you want the flight group to begin its mission, then click the controller button. A starting

point icon will now appear on the map. If you decide you want to relocate the starting point, move the arrow to the desired location, and click the button again. RAF flight groups can only begin their missions over England or the English Channel. Luftwaffe flight groups can only begin their missions over Continental Europe or the English Channel.

Now, look for the word ALT next to the words FLIGHT PLAN. This shows the current cruising altitude for this flight group, in thousands of feet. Clicking the left controller button increases the altitude at which that group begins your mission, and clicking the right controller button decreases it.

The locations of the four Way Points are set the same way you set the BEGIN location. First, click on WAY PT 1, move the arrow to the desired location on the map, and click your controller button. An icon will appear on the map to represent the location of WAY PT 1. To adjust the altitude for your flight group flying toward WAY PT 1, click on the number below ALT. Repeat this procedure for WAY PT 2, 3, and 4 if you want. With these different Way Points, you can plot a course for each side to follow in your mission

During fighter Combat Air Patrol (CAP) missions, the flight group flies between the Way Points until it runs low on fuel. For bombing missions, the flight group only follows the flight plan once. For fighter escort missions, the flight group stays near the bomber flight group it is escorting, regardless of the flight plan created for it, unless the bombers have all been destroyed.

Any bomber or fighter/bomber flight group will automatically bomb a target if it is located where you've placed a Way Point icon. If you don't want the flight group to attack this target, look for the word ATK (attack) next to ALT. A YES will appear if an attack will occur. Click on YES to erase this word, and call off the attack.

To assign each flight group to a landing area after you have assigned them to different Way Points, click on LAND, move the arrow to the desired airfield, then click the controller button.

After you've created a flight plan, you may want to remove one or more of the Way Points. To do this, click on the Way Point you'd like to remove, then click the DELETE button, which is located to the right of the LAND button. This removes the Way Point icon from the map.

"Don't hide your fears from yourself; hide them only from those weaker and more timid than yourself. See that your company is good. Sleep well. And don't forget your earplugs."

Dr. Edward Glover, Director of the London Clinic of Psycho-Analysis, on how to deal with air raids

"In war there is no second prize for the runner-up."

General Omar Bradley

As you create flight plans for all of the flight groups for both sides, their starting points will be marked by icons on the map.

Convoys

If you're looking for a suitable dive-bombing target for a Ju 87 Stuka or a Ju 88 flight group, you can include a ship convoy in your mission. To do this, look at the buttons in the lower right-hand corner of the screen. Click the controller on CONVOY to choose between a YES or a NO setting. If you choose YES, click the controller on # SHIPS to choose how many ships will be in the convoy. To determine the location where the convoy will start, click on START LOC. Now, every time you click the controller, a black convoy icon will move around to various locations in the English Channel. Keep clicking until the convoy icon is positioned in the desired location.

Changing the Settings for Your Aircraft

If you'd like to modify the features of your aircraft in your mission, press the SETTINGS button from the Flight Group buttons. You'll then see four new buttons:

TIME Use this to change the time of day you'll begin your mission, from 0 to 23:00 hours.

AMMO Use this to change between "STANDARD" or "UNLIMITED" amounts of ammunition you'll carry. In the "STANDARD" mode, you'll carry the same number of gun or cannon rounds as German and British aircraft in 1940. In the "UNLIMITED" mode, you'll never run out of ammunition.

FUEL Use this to change between "STANDARD" or "UNLIMITED" fuel capacity. In the "STANDARD" mode, you'll carry a finite supply of fuel, and use it up as you go along. In the "UNLIMITED" mode, you'll have an endless supply of fuel.

DAMAGE Use this to change between "STANDARD" or "UNLIMITED" amounts of battle damage that can be sustained by your aircraft. In the "STANDARD" mode, your plane can be damaged and shot down by enemy gunfire. In the "UNLIMITED" mode, your aircraft is invincible.

If you change the AMMO, FUEL, or DAMAGE settings to "UNLIMITED," the results of your mission will not count on your Combat Record.

A SAMPLE MISSION: STEP BY STEP

Though the Mission Builder may seem complex at first glance, it is actually fairly easy to create a mission with it.

For example, let's say you want to create a mission where you defend the RAF airfield at Hawkinge with three Hurricanes against a level bombing attack by three He 111 bombers and three escorting Bf 109 fighters. First, set the composition of the RAF forces by clicking on FLIGHT GROUP. For FLIGHT GROUP 1, choose "HURR MKI" from the PLANE TYPE, and "3" from # PLANES. Choose "VIC" from FORMATION, "TOP ACE" from EXPERIENCE, "CAP PRIORITY BOMBERS" from ORDERS (ordering the Hurricanes to go after the bombers instead of the fighters), and "1" from WAVES. Since the Luftwaffe will be attacking Hawkinge, create a flight plan where your fighter CAP covers this airfield from many directions. Finally, you might as well designate the aircraft you'll be flying to the leader position.

Now for the Luftwaffe. For FLIGHT GROUP 2, choose "He 111H-3," and for FLIGHT GROUP 3, choose "Bf 109E-3." For # PLANES, choose three for each flight group. Then, go down the flight group list to set the other variables for the two flight groups. Since Flight Group 3 will be escorting Flight Group 2, be sure to designate that with the ESCORT FG button. Then, create a flight plan for Flight Group 2 so that the bombers will fly straight in to Hawkinge, bomb it, and then head for home. Create a flight plan for Flight Group 3 in case you manage to shoot down all of the bombers in Flight Group 2.

"Because of the lack of a plan for Sea-lion the Luftwaffe was thrown in as a stop-gap to bridge the interval until the curtain rose on the next act — Russia. In justice to our achievement it must be said that if we never reached our goal we were certainly well on the way to it."
Generalfeldmarschall Albert Kesselring

The mission you're building is nearly completed. Now, click on the name bar, and type in a name for your mission. Click on SAVE to store it on disk. (If you're using a floppy disk to save the game, insert one at this time.) To fly the mission, exit the Mission Builder, and start up the game program. When you're at the Main Menu, select FLY CUSTOM MISSION, then select the name of your mission. Soon, you'll be flying a Hurricane over Hawkinge — against a larger Luftwaffe force. Good luck!

SUGGESTED READING

When we began working on the game design and manual for *Their Finest Hour,* we were pleasantly surprised to find that a wealth of information exists on the subject of the Battle of Britain. To gain a better understanding of this epic air duel, we recommend the following books:

Battle for Britain by Ronald W. Clark

Fighter by Len Deighton

The First and the Last by Adolf Galland

Summer, 1940: The Battle of Britain by Roger Parkinson

Duel of Eagles by Peter Townshend

The Narrow Margin by Derek Wood and Derek Dempster



To alert the public to their wartime duties, the British government printed a variety of posters, which appeared in subways, on billboards, and at other locations. This one warned of the dangers of telling wartime secrets to a floozy who might turn out to be a Nazi spy.

A visit to the Smithsonian Air and Space Museum in Washington, D.C., is also highly recommended. Besides being one of the most interesting museums around, it's also one of the most fun. The Air and Space Museum features an actual Spitfire and Bf 109, plus many other famous World War II aircraft and memorabilia. It also has a research library, whose staff graciously supplied us with many of the photographs used in this manual, and was of invaluable assistance.

In addition, we encourage you see the movie *The Battle of Britain*, which was released in 1969. It features plenty of terrific aerial acrobatics by Spitfires, Hurricanes, Bf 109s, and even He 111s that will really put you in the mood to play the game. For a more documentary-type look at the events of 1940, part three of the series *Why We Fight* is also recommended. Although it was a U.S.-made propaganda film, and consequently is heavily biased (a map of Scandinavia and Northern Europe turns into "the jaws of the Nazi whale"), its documentary footage is well worth seeing.

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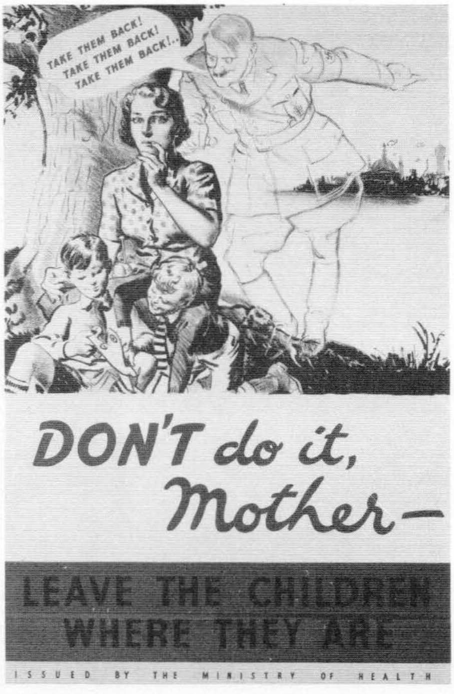
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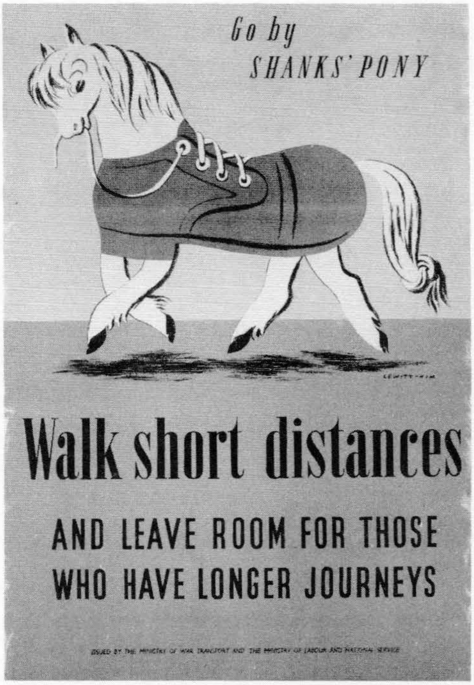
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"War is much too serious a matter to be entrusted to the military."

Charles Maurice de Talleyrand-Perigord

With London under enemy attack, some two million children were evacuated to temporary foster homes in the countryside. This poster warned of the dangers of bringing them back to the city.





British citizens were urged to take strides to conserve fuel and keep the roads clear for the military

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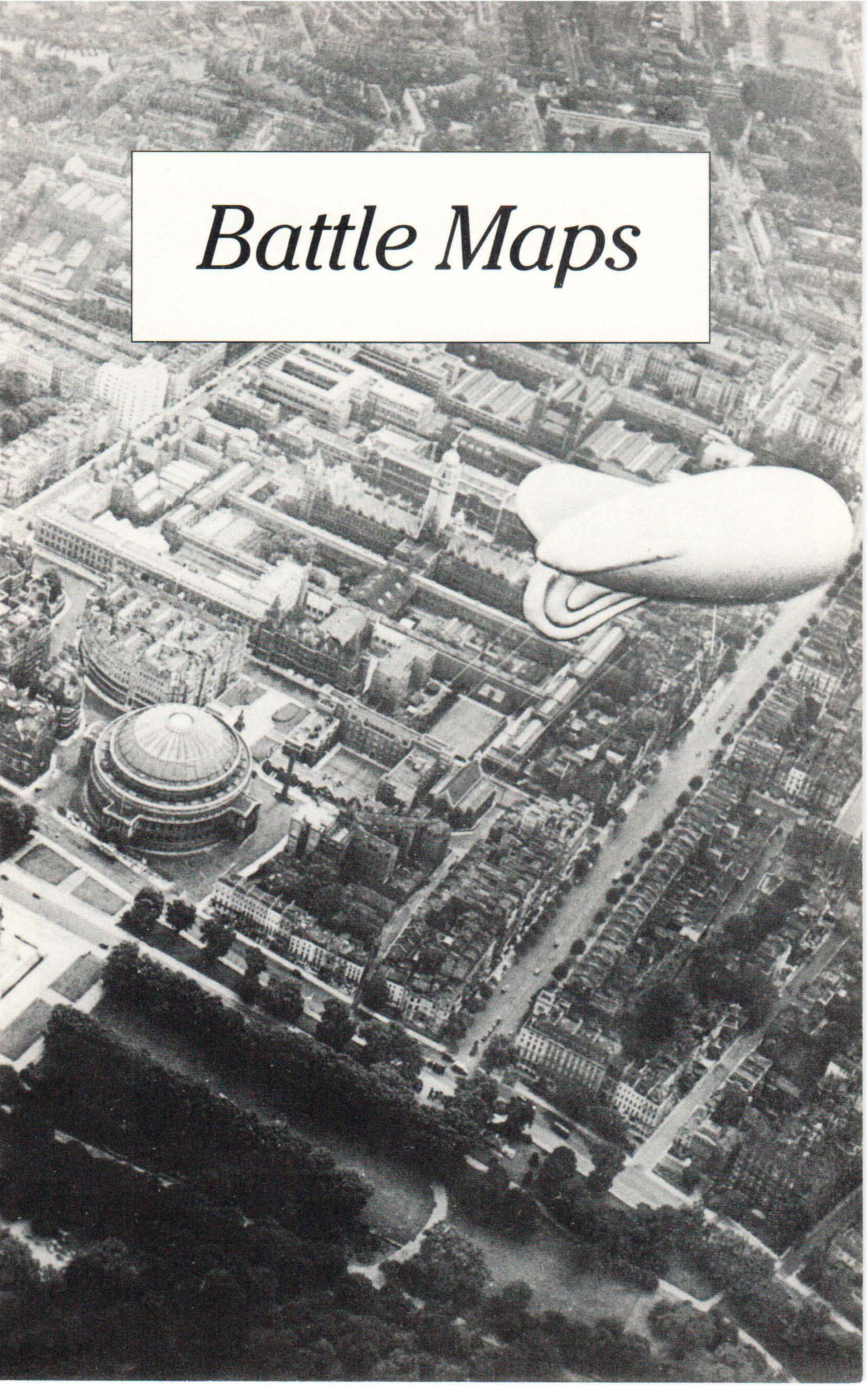
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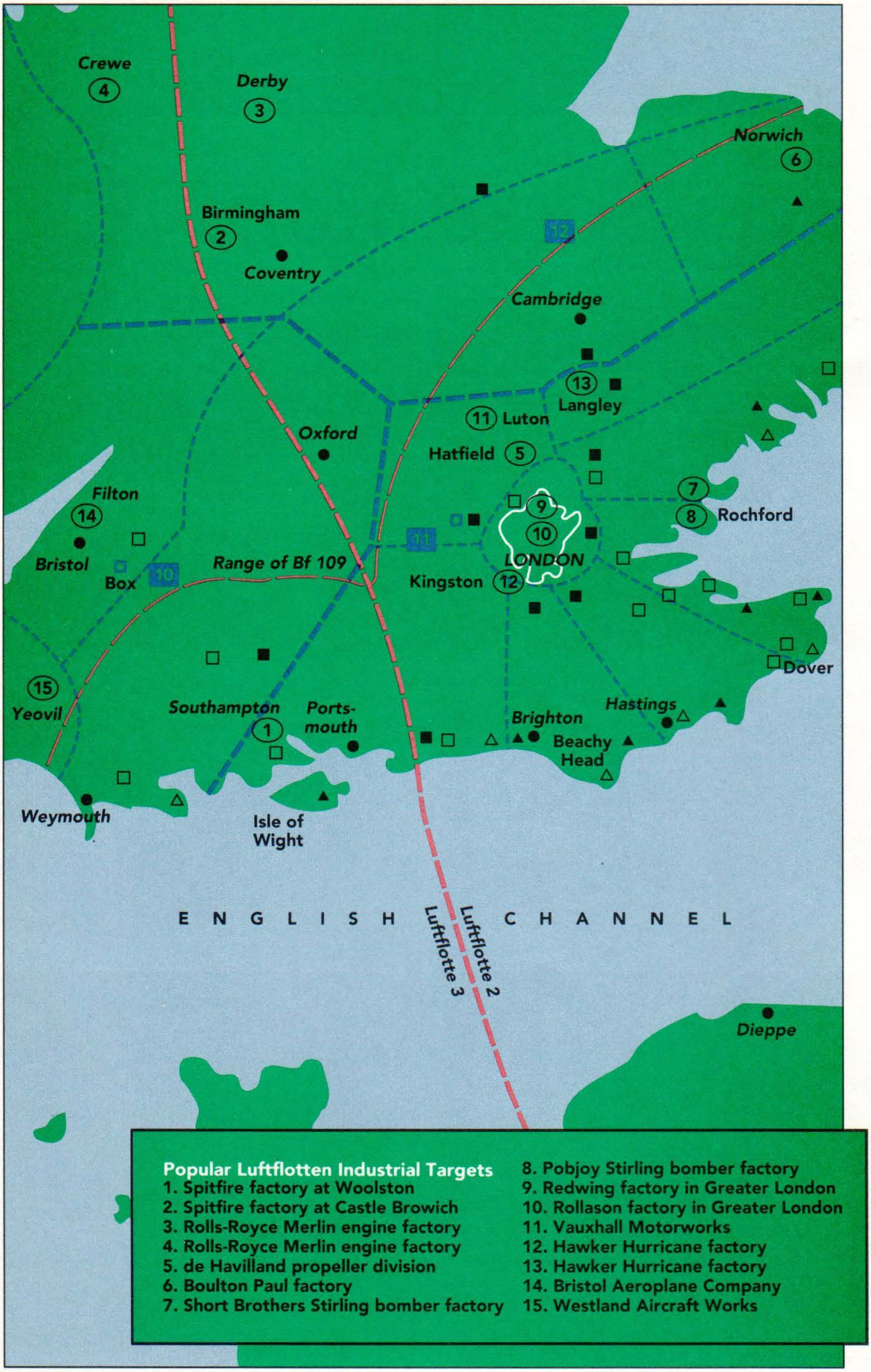
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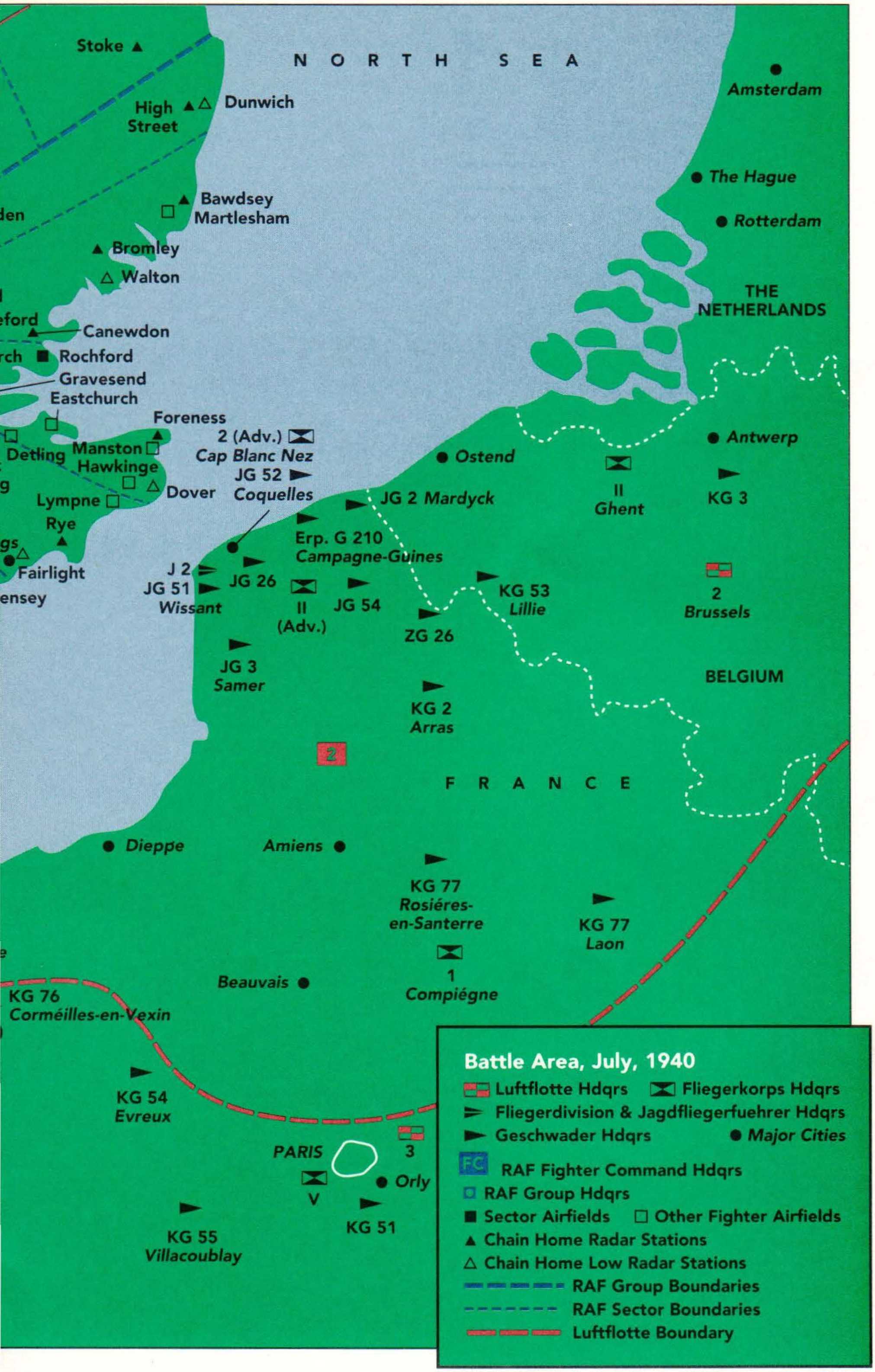
Opposite page: A barrage balloon floats high above the Royal Albert Hall in London

Battle Maps




Crewe
4
Derby
3
Norwich
6
Birmingham
2
Coventry
12
Cambridge
13
Langley
11 Luton
Oxford
Hatfield 5
7
8 Rochford
Filton
14
Bristol
Box
10
Range of Bf 109
11
9
10
LONDON
Kingston 12
Dover
15
Yeovil
Southampton
1
Ports-
mouth
Brighton
Hastings
Beachy
Head
Weymouth
Isle of
Wight
ENGLISH CHANNEL
Luftflotte 3
Luftflotte 2
Dieppe
Popular Luftflotten Industrial Targets
1. Spitfire factory at Woolston
2. Spitfire factory at Castle Browich
3. Rolls-Royce Merlin engine factory
4. Rolls-Royce Merlin engine factory
5. de Havilland propeller division
6. Boulton Paul factory
7. Short Brothers Stirling bomber factory
8. Pobjoy Stirling bomber factory
9. Redwing factory in Greater London
10. Rollason factory in Greater London
11. Vauxhall Motorworks
12. Hawker Hurricane factory
13. Hawker Hurricane factory
14. Bristol Aeroplane Company
15. Westland Aircraft Works


GREAT BRITAIN
Wittering
Birmingham
Coventry
12
Cambridge
Duxford
Debd
Oxford
North Weald
Staple
Northolt
Hendon
Uxbridge
Hornchur
LONDON
11
Filton
Colerne
Bristol
Box
10
Range of Bf 109
Croydon
Kenley
Biggin Hill
West Malling
Middle Wallop
Boscombe Down
Poling
Southampton
Ports-mouth
Tangmere
Brighton
Hasting
Exeter
Warmwell
Gosport
Beachy Head
Peve
Truleigh
Westhampnett
Hawks Tor
Weymouth
Worth
Isle of Wight
Ventnor
W. Prawle
Luftflotte 3
Luftflotte 2
ENGLISH CHANNEL
VIII (Adv.)
JG 53
Cherbourg
JG 27
Le Havre
N
0
50
MILES
ZG 2
St. Aubin
3 (Adv.)
VIII
J 3
Deauville
St. G 1
St. G 2
St. G 77
3
St. Malo
IV
Dinard


NORTH SEA
Stoke
High Street
Dunwich
Bawdsey
Martlesham
Bromley
Walton
Canewdon
Rochford
Gravesend
Eastchurch
Foreness
Detling
Manston
Hawkinge
Dover
Lympne
Rye
Fairlight
2 (Adv.)
Cap Blanc Nez
JG 52
Coquelles
JG 2 Mardyck
Erp. G 210
Campagne-Guines
J 2
JG 51
Wissant
JG 26
II
(Adv.)
JG 54
KG 53
Lillie
ZG 26
JG 3
Samer
KG 2
Arras
Amsterdam
The Hague
Rotterdam
THE NETHERLANDS
Antwerp
Ostend
II
Ghent
KG 3
2
Brussels
BELGIUM
FRANCE
Dieppe
Amiens
KG 77
Rosiéres-en-Santerre
KG 77
Laon
1
Compiégne
Beauvais
KG 76
Corméilles-en-Vexin
KG 54
Evreux
PARIS
3
V
Orly
KG 51
KG 55
Villacoublay
Battle Area, July, 1940
Luftflotte Hdqrs
Fliegerkorps Hdqrs
Fliegerdivision & Jagdfliegerfuehrer Hdqrs
Geschwader Hdqrs
Major Cities
RAF Fighter Command Hdqrs
RAF Group Hdqrs
Sector Airfields
Other Fighter Airfields
Chain Home Radar Stations
Chain Home Low Radar Stations
RAF Group Boundaries
RAF Sector Boundaries
Luftflotte Boundary

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